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NATIONAL WATER SUPPLY ISSUES

HEARING

BEFORE THE

SUBCOMMITTEE ON FISHERIES, WILDLIFE, AND WATER

OF THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

FIRST SESSION

NOVEMBER 14, 2001

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ONE HUNDRED SEVENTH CONGRESS
FIRST SESSION

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C O N T E N T S

NATIONAL WATER SUPPLY ISSUES

WEDNESDAY, NOVEMBER 14, 2001

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON FISHERIES, WILDLIFE, AND WATER,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:37 a.m. in room 406, Senate Dirksen Building, Hon. Bob Graham (chairman of the subcommittee) presiding.

Present: Senators Graham, Campbell, Corzine, Crapo and Jeffords.

OPENING STATEMENT OF HON. BOB GRAHAM, U.S. SENATOR FROM THE STATE OF FLORIDA

Senator GRAHAM. Good morning. I call to order the Senate Committee on Environment and Public Works, Subcommittee on Fisheries, Wildlife and Drinking Water.

I will give an abbreviated version of my opening statement and will be followed by our chairman, Senator Jeffords, and ranking member, Senator Crapo. Then we will proceed to the first panel.

This hearing today is part of a series of hearings on water issues facing America. Today's focus is on the role of the supply of water and the appropriate position of the Federal Government. Another title for this hearing, which was developed back in the spring which might be slightly less obvious today, is "Drought in America."

Over the last decade, America has experienced a significant decrease in water availability. There are numerous potential causes for this trend, including reduced rainfall, increased populations and changes in water use patterns. The availability of clean, fresh water at the time when you need it is something that most Americans have taken for granted. However, this is not the case globally. It is not the case in some areas of our country and it may not be the case in more areas if current trends continue.

In 1997, the United Nations assessment of the fresh water resources of the world included some disturbing predictions about the availability of water resources in our future. The report states that water use has been growing at more than twice the rate of population increase during the 20th century. It goes on to say that by the year 2025 as much as two-thirds of the world population could be under stress conditions in terms of the availability of fresh water.

Water shortages can impact public health, limit economic and agricultural development and damage ecosystems. This situation af-

fects the United States, as well as other parts of the world. In 1900, U.S. water withdrawals for all purposes were 56 cubic kilometers per year. By 1950, total water withdrawals were 250 cubic kilometers per year. Water use peaked in the United States in 1980 with total withdrawals of more than 500 cubic kilometers per year. These changes represent a tenfold increase in water withdrawals in a period in which population in the United States increased by a factor of four.

These statistics do not speak well for our future. The U.S. Census Bureau estimates that our population today is approximately 285 million people. The U.S. Bureau of Census estimates that by the beginning of the next century, approximately 99 years from now, our population will be 571 million. If our consumption rates continue to grow during the next 100 years at the pace they did during the last, we will likely face even more significant water shortages than we are already feeling.

No part of the country is unaffected by this. In my home State of Florida, we experienced a severe drought that lasted for the better part of this year. The lack of rain was part of a 7-year drought cycle and the State was eventually forced to implement unprecedented levels of drought mitigation. I know the members of this committee could cite similar examples from their States and their regions of the country.

Today, it is our hope to learn more from our witnesses about these trends and identify any fundamental issues that are driving them. For example, are we experiencing a cyclical downturn in rainfall or are there more basic changes in climate or other natural systems at work? Are the changes we are seeing due to conditions in our current water supply system that mask the true cost of a given unit of water to consumers?

I also plan to discuss with each of the witnesses ideas for appropriate sets of public policy initiatives that the Federal Government should undertake. I hope to use the results of these discussions in our subcommittee's work on water infrastructure legislation over the course of the next few months. In particular, we will be using information gathered today to answer questions such as, What is the value of a given unit of water? How can we assure that our treatment of water infrastructure cost gives transparent price signals to water users who can use that information to make good decisions about the quantity of water they use?

I recognize that some of the recommendations we receive today could fall outside the immediate jurisdiction of this subcommittee. Should this occur, Senator Crapo and I will pass those recommendations on to the appropriate other Senate committees.

I am particularly pleased to welcome our Federal witnesses today from the U.S. Army Corps of Engineers, the Bureau of Reclamation, the U.S. Geological Survey, the Department of Agriculture and the Environmental Protection Agency's Office of Waste Water Management.

We will commence the panel after opening statements from, first, Senator Crapo, then Senator Jeffords.

OPENING STATEMENT OF HON. MICHAEL D. CRAPO, U.S. SENATOR FROM THE STATE OF IDAHO

Senator CRAPO. Thank you very much, Mr. Chairman.

I commend your efforts to address this complex issue. I have maintained for some time that water was going to increasingly become one of the most critical issues we deal with in our Nation, and I appreciate the attention that you are giving to our Nation's water infrastructure needs.

I also appreciate our witnesses joining us here today to share their thoughts on the subject of water supply and to discuss ideas related to the appropriate role of the Federal Government in addressing this issue. Issues of water supply are critical to Idaho and throughout much of the country, as are these continuing drought issues that the chairman has mentioned. I am also a member of the Senate Committee on Agriculture where we are marking up portions of the Farm bill today, Mr. Chairman, and I apologize that I am going to have to leave rather early in this hearing to get to that Ag Farm bill markup, where we are also dealing with issues directly related to water. But this morning, please accept my apologies. I will keep my opening comments brief.

Idaho, like many other regions of the country, is currently experiencing a severe drought. Numerous Idaho counties were declared disaster areas this past summer because of the severity and persistence of this drought. Close coordination between Federal agencies, State agencies and the power industry was necessary to reduce adverse impacts to water users, to our power generation and to natural resource protection. Add to this the projection that the population in the West is expected to increase by 30 percent in the next 20 to 25 years, and it is not hard to envision that these and other water supply issues will only intensify in the future.

In the past, Congress has repeatedly recognized the primary jurisdiction of the States and local governments in managing and developing water supplies. This has been reinforced over the years in numerous Federal statutes relating to water resources. I have personally been a strong advocate of the need to protect the sovereignty of the States in regard to water right jurisdiction. Therefore, I would encourage all of us to keep in mind the critical role of the States in managing water rights when we address the role that the Federal Government might take in dealing with national water supply issues.

I also recognize the valuable role the Federal Government has provided and should continue to provide in the form of technical assistance and expertise to State and local governments relating to their management of water resources. The legislation the chairman just mentioned, which deals with our Clean Water Act and the water infrastructure needs of our Nation are good examples of the kinds of things the Federal Government can do to assist without intruding on the jurisdiction of the States to control the management and allocation of water rights.

I also want to take this opportunity to specifically welcome John Keys and Dr. Roy Mink who are both here today. John Keys is currently the Commissioner of the Bureau of Reclamation at the Department of Interior. Prior to this assignment, he served as the Regional Administrator for the Bureau in Boise, ID. His work with

irrigators, stakeholders and local communities was invaluable in helping to resolve many of the potential conflicts that arise from the competing interests in water resource issues. We are sorry to see him leave Idaho, but I am pleased that he has moved on to share his expertise with the Bureau nationally.

Roy Mink is the past president of the National Institute of Water Resources and currently serves as the director of the Idaho Water Resources Research Institute at the University of Idaho. His research work in hydrology at the University of Idaho has made that university one of the Nation's leading institutes in natural resource management, and water resources in particular. His role as president of the National Institute was instrumental in helping Congress' reauthorization of the Water Resources Research Act in the last session. The Institute provides critical research and expertise to Federal, State and local governments in the complex issues surrounding water resource management.

I look forward to hearing their testimony and the testimony of all the witnesses here. Those who I can't hear personally, I promise you I will read your testimony as you submit it for the record.

Mr. Chairman, the Western States Water Council has submitted written testimony to the subcommittee that I request be added to the official record of this hearing.

Senator GRAHAM. Without objection.

Senator CRAPO. In closing, I would just like to also note my good friend Mike Parker is here. I served with him in the House of Representatives and I am glad to see you here now working with the Corps.

With that, I once again thank all of our witnesses for joining us today to provide testimony on this important issue, and I thank you for holding this hearing, Mr. Chairman.

Senator GRAHAM. Thank you, Senator, and I appreciate the importance of your participation in the committee markup. Whenever it is necessary for you to leave, you will be missed, but we know you are doing your duty.

Senator CRAPO. Thank you very much.

Senator GRAHAM. Senator Jeffords.

OPENING STATEMENT OF HON. JAMES M. JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

Senator JEFFORDS. Thank you, Mr. Chairman.

I appreciate being here today. I am looking forward to the testimony, and I want to thank the witnesses also for being here.

When we think of water supply issues, we most often think of agriculture and the West or Midwest. However, I suspect that we will hear today that water supply issues, whether the issue is too little water or too much water, impact all areas of the country.

Right now, Vermont is in its sixth month of very dry, drought-like conditions. The municipal water system serving the largest population centers generally have adequate supply—like Lake Champlain. However, the large majority of rural Vermonters draw their water from individual wells. Many, many of these wells are stressed by drought. Well-drillers are booked solid through the end of the year.

With winter fast approaching, it is that much more difficult to deal with water supply issues and there is little hope of wells or springs recharging once the ground freezes. There are no established programs through which the State can assist these individuals, many of whom are economically challenged. The USDA Rural Development Program does have some assistance available to rural homeowners, but this program is often not ideally structured to meet the needs of Vermonters. I am deeply concerned about the rural families of Vermont and their well-being over the long winter. I believe that if some action is not taken, portions of the State will truly be facing a crisis in the coming months.

I want to share with the committee and our witnesses the story of one Vermonter that is reminiscent of the pioneering days of westward expansion in our Nation. An elderly woman who lives alone in rural Vermont is faced with an almost insurmountable burden in the coming winter. Her well has run dry, and like many Vermonters she may not be able to get a new well drilled before the winter sets in. To survive the winter and gather water for the most basic of bathing, cooking and cleaning needs, she will be traveling half a mile to her nearest neighbor's home and carry water through the snow back to her house.

I plan to work over the next few weeks with my colleagues in the subcommittee and in the full Congress to ensure that USDA's Rural Development Program has the resources and the ability to provide assistance to those in crisis due to water shortages this winter.

I also plan to work with my colleagues to make emergency grants, if required, through the Environmental Protection Agency to ensure that the people of Vermont have access to the most basic services that every American enjoys. I am pleased that this subcommittee is taking a thorough look at the water policy issues facing our Nation before proceeding with water infrastructure legislation in January.

I want to take a few minutes to introduce Mr. Jay Rutherford who is one of the witnesses today on our second panel, and hails from Waterbury, VT. Jay is director of the Water Supply Division for the Vermont Department of Environmental Conservation, a position he has held since 1992. In this capacity, Jay is responsible for management of the State's Drinking Water Program, Groundwater Protection Program, and the Drinking Water State Revolving Fund. He administers the State's Comprehensive Source Protection Plan.

Prior to assuming the directorship of the department, Jay oversaw the administration of both the drinking water and waste water grant and loan programs for the State. He was also responsible for the development and implementation of these programs' information management systems. Jay has also had experience as an engineer consultant, a software author, a public school teacher and a Peace Corps volunteer. He received his BS in civil engineering from the University of Vermont and is a registered professional engineer.

I am very pleased that Jay can be here with us today to offer the benefit of his expertise on water issues in Vermont, as well as the cumulative knowledge of the association. I also hope that we

will continue to utilize his expertise in administration of the water and waste water grant and loan programs for Vermont as we proceed with the water infrastructure legislation.

Thank you, Mr. Rutherford, for joining us. I am sorry that I have to depart for other obligations.

Senator GRAHAM. Thank you very much, Senator.

[The prepared statement of Senator Jeffords follows:]

STATEMENT OF HON. JAMES JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

I want to thank our witnesses for appearing today before the Subcommittee to discuss this critical issue with us. When we think of water supply issues, we most often think of agriculture in the arid west or Midwest. However, I suspect that we will hear today that water supply issues, whether the issue is too little water or too much water, impact all areas of the country.

Right now, Vermont is in the 6th month of very dry, drought-like conditions. The municipal water systems serving the largest population centers generally have adequate capacity. However, the large majority of rural Vermonters draw their water from individual wells.

Many, many of these wells are stressed by drought. Well—drillers are booked solid through the end of the year. With winter fast approaching, it is that much more difficult to deal with water supply issues and there is little hope of well or springs recharging once the ground freezes.

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He was also responsible for the development and implementation of those programs' information management systems. Jay has also had experience as an engineering consultant, a software author, a public school teacher, and a Peace Corps volunteer. He received a B.S. in Civil Engineering from the University of Vermont and is a Registered Professional Engineer. I am very pleased that Jay can be here with us today to offer the benefit of his expertise on water issues in Vermont as well as the cumulative knowledge of the Association.

I also hope that we continue to utilize his expertise in administration of the drinking water and wastewater grant and loan programs for Vermont as we proceed with water infrastructure legislation.

Senator GRAHAM. We have been joined by Senator Campbell. Senator, do you have an opening statement?

OPENING STATEMENT OF HON. BEN NIGHTHORSE CAMPBELL, U.S. SENATOR FROM THE STATE OF COLORADO

Senator CAMPBELL. Thank you, Mr. Chairman. Yes, I have a short one.

I would also like to welcome the witnesses here. John Keys has a very fine reputation in our State, too—a man of sound voice on water management and I am happy to see him. My old colleague Mike Parker—I haven't seen you for a couple of years. Mike, it is very nice to see you here again. Let me maybe just make a couple of comments as a westerner, as Senator Crapo did, Mr. Chairman. There is an old saying, I think it was attributed to Mark Twain, who said, "In the West, whisky is for drinking and water is for fighting." As many of us in the West know, prior to statehood, territories in the West had adjudicated their water claims in a system of water courts, and the Federal Government historically has recognize this distinction between the East and the West in the treatment of water and how the law reflects the differences.

Unlike the eastern seaboard, in fact many other regions of the country, we are subject to very wide swings in water supply. In fact, in many of our States we store over 80 percent of the water we need for the year, as opposed to 15 percent in most of the eastern seaboard States. They say in many places in the East you can drill 15 feet, and I am sure in your State of Florida you can probably drill 15 or 20 feet and you will find water. There are places out in our States of Idaho and Colorado and Montana and Nevada you can drill 1,500 feet and you still won't find water.

So we look at water as a property right, and in fact as you know in the West we can take it from the land and sell it separate from the land. We can sell water to one person and sell the land to somebody else. It has initiated a whole different kind of a system of law and how we use our water. To complicate it, we have to balance the needs of the National Parks, the endangered species, the agriculture, the public, the priority Indian tribal rights and a number of different compacts—interstate compacts between upper and lower basin States and compacts between our States and the United States and Mexico, too.

So we have a whole different concept, as you might guess, in how we deal with water. But it does provide some particular challenges to the western water users. In my State, as an example, the continental divide runs right up the middle of our State. Eighty percent of our population in Colorado live on the front range, but eighty percent of the water is on the western side. That in itself creates a problem where we have more than enough water on one side of the mountain that we own under the compacts, and yet we have difficulty in getting it to the people who need it. So we have to look for some innovative approaches, particularly since, as I understand it, our State is going to grow about 30 percent in the next 20 years.

I know that Congress generally appreciates that water is a scarce resource and that we look at it a little differently in the West. I think it is really important to recognize that a lot of the overdue water projects that were designed in the 1960's to help us share the water among the scarcity of all the competing demands, some of them are long overdue. One of them, John Keys just told me, will probably get off the ground very shortly. The Adamsville Platte was authorized in 1968. So you can see are way behind on trying to provide the water to the people that need it in our States.

In any event, I do look forward to the testimony. Like everyone, I have a conflict, too. I have a markup in appropriations at 10:30, but I am going to stay as long as I can.

Thank you, Mr. Chairman.

[The prepared statement of Senator Campbell follows:]

STATEMENT OF HON. BEN NIGHTHORSE CAMPBELL, U.S. SENATOR FROM THE STATE OF COLORADO

Thank you for holding this hearing on the Federal role in meeting water supply.

Water is our most precious resource. As such, interested parties have fought over water since time-in-memorial.

Water conflicts between competing users are most pronounced in the arid West, where water is a scarce resource.

Prior to statehood, territories in the West have been adjudicating water conflicts through a system of water courts. The Federal Government historically has recognized the distinctions between the East and the West and the treatment of water in the law reflects those differences.

Unlike other regions of the country, the West is subject to wide swings in water supply, and often experiences significant drought conditions, thereby reducing an already scarce resource.

Western States must adjudicate water claims to find equitable distribution of water between a growing number of competing users. Making sure that there is enough water to maintain endangered species, national parks, agriculture, and the public at large, and honoring Indian water rights' claims, can be a challenging task.

Furthermore, the geography of the West provides particular challenges in meeting the needs of water users. In my own State of Colorado, eighty percent of the water is on the Western slope, yet eighty percent of the people live east of the continental divide. That fact alone requires innovative approaches to getting the water to the people that need it. However, considering that Colorado's population is projected to grow more than forty percent (or 1.5 million people) by 2015 underscores an already dire situation.

We, in Congress, must appreciate that water is a scarce resource and that the Federal Government should continue to defer to Western States in adjudicating water rights. The Western water States are the best arbiter of water claims and the current system should be respected and preserved.

It is important to address our Nation's aging water infrastructure. Yet, it is just as important to look ahead so that we will have secure water supplies in the West. Moving forward on planned water projects, such as the Animas La Plata, is the responsible and right thing to do.

In planning for the future, States must know how much water the various Federal agencies of jurisdiction claim. Therefore, I would hope that those agencies expeditiously quantify their claims so that interested States can apportion their water with forethought.

Thank you Mr. Chairman. I look forward to the testimony of our witnesses.

Senator GRAHAM. Thank you, Senator.

Again, I wish to express my appreciation to the panel. I know that you will provide us with some very insightful commentary based on your experience in these important issues.

Our first panel is the Honorable Mike Parker, who has recently become the Assistant Secretary of the Army for Civil Works—Mike, thank you for joining us; Mr. John Keys, Commissioner of the Bureau of Reclamation, Department of the Interior; Mr. Robert

Hirsch, Assistant Director for Water of the U.S. Geological Survey, also the Department of the Interior; Mr. Tom Weber, Deputy Chief of Programs, Natural Resource Conservation Service of the Department of Agriculture; and Mr. Mike Cook, Director of EPA's Office of Waste Water Management.

Mr. Parker.

STATEMENT OF HON. MIKE PARKER, ASSISTANT SECRETARY OF THE ARMY FOR CIVIL WORKS

Mr. PARKER. Thank you, Mr. Chairman and members of the subcommittee, especially my friend, Senator Campbell.

I appreciate the opportunity to speak to you today on the Army Corps of Engineers' activities to address the water supply issues of the Nation.

In your call for this hearing, you asked that we respond to three specific questions. I will respond to your questions in order. First, you asked that we present our perspective on water supply in the United States today, including the extent to which there is or is not a water supply problem today or in the future; a description of that problem if we believe one exists, including regional differences; and a discussion of the potential cause of this problem.

We believe the Nation faces many challenges in assuring an adequate water supply. These challenges now affect all regions of the country, not just the traditionally dry areas. The availability of reliable and clean supplies of water is crucial to the health of our citizens and to maintaining the Nation's economic prosperity both now and in the future.

In a series of listening sessions the Corps held last year, citizens around the Nation voiced their concerns about various aspects of water supply at every session. At these listening sessions, the public called for better data to understand the scope and nature of the water supply problems we face. The last comprehensive assessment of the Nation's water needs was completed over 15 years ago.

The public also told us that water supply is more than a local problem. Municipal leaders told us that supporting growth in an environmentally sustainable manner will require regional solutions. Consequently, new water supply projects that are feasible and efficient must often be located outside the limits of the municipalities that seek additional supplies. Technical leadership will be essential to integrate competing values across multiple political jurisdictions to reach consensus for regional water supply solutions.

As an example, in landmark 1997 legislation, the State of Texas recognized these new realities and designated 16 regions to lead the development of future water supply. Larger communities within these regions were designated to take the lead for their regions.

Your second question asked us to address the extent that the Federal programs under our jurisdiction work to ensure that State and local governments are meeting water supply needs. It has been longstanding policy that municipal and industrial water supply projects are considered the primary responsibility of non-Federal parties. The authorities under which the Corps of Engineers provides water supply storage are generally project-specific and a secondary purpose for the development of a project.

We can provide water supply storage at completed projects by reallocating storage for other purposes and evaluate the potential for new water supply as part of planning multi-purpose projects. At the present time, the Army operates 117 reservoirs containing about 9.5 million acre-feet of storage authorized and available for municipal and industrial water supply use. We also maintain approximately 57 million acre-feet of storage for agricultural irrigation in 50 reservoirs. Overall, we have over 400 reservoirs that could be modified or have existing storage that may be available for reallocation to provide additional municipal and industrial water supply storage.

I want to emphasize the Corps' involvement in water supply is founded on deference to State water rights. During the enactment of the Flood Control Act of 1944, Congress made clear that we do not own water stored in our projects. Our practice is to contract with non-Federal interests for water storage in our projects. Our policy is to continue our commitment to consistency with State water law.

The Corps of Engineers is currently working with other Federal agencies and with State and local interests to help solve several large complex regional water problems. For example, as part of the Comprehensive Everglades Restoration Plan, the Corps of Engineers is undertaking a technical evaluation of complex systems and balancing competing demands for available water resources in the development of a comprehensive regional solution. This effort integrates diverse needs, objectives and ongoing complementary efforts of multiple Federal, State, local and other interest groups. Although the Federal interest is primarily environmental restoration, this interest is closely linked in the case of the Everglades with water quality improvement, water supply and flood damage reduction.

Another example is the comprehensive assessment of the demands and water resources available on the Apalachicola-Chattahoochee-Flint and Alabama-Coosa-Tallapoosa River systems to assist the affected States in reaching decisions on allocation of available water. These efforts included the development of alternative scenarios and options on which allocation decisions can be based.

Your final question asked us to review what actions, if any, Congress should take to facilitate an efficient and effective Federal role in water supply. Participants in our listening sessions told us that they looked to cooperative efforts between the Federal Government and States in developing integrated regional management of water resources, including water supply. Our management of water must be based on economic and environmental benefits and cost. Decisions must be science-based choices among a full array of alternative uses to which our watersheds and river basins may be put. In doing this, we must respect the primacy of State water law.

Congress should work with the Administration to ensure that our Nation has the framework to provide integrated water management. This framework should include the appropriate roles of the Federal and non-Federal levels of government and the very powerful part that the private sector must play in any solution to our water resources challenges.

In conclusion, I believe we are facing emerging water supply challenges. Consistent with the goals of the president, the Army Corps of Engineers stands ready to work with its sister agencies in contributing to the dialog. We will continue our stewardship of our existing projects to manage water storage for efficient uses, including water supply, and maintain our commitment to consistency with State water rights.

Mr. Chairman, this concludes my statement and I would be pleased to address any questions that you or anyone on the committee may have.

Senator GRAHAM. Thank you very much, Mr. Parker. I appreciate that very constructive statement and look forward to some questions.

Mr. Keys.

Mr. KEYS. Mr. Chairman, I am John Keys, Commissioner of the Bureau of Reclamation. It is certainly a pleasure to be here today. This is not our normal committee and it is nice to be able to talk to some other folks about water supply in the West.

Senator GRAHAM. We will try to treat you well enough that you will want to come back.

Mr. KEYS. That sounds good to me.

I would first ask that my full written statement be made part of the record, if you would.

Senator GRAHAM. It shall be, yes.

Mr. KEYS. Good.

STATEMENT OF JOHN KEYS, COMMISSIONER, BUREAU OF RECLAMATION, DEPARTMENT OF INTERIOR

Mr. KEYS. When first asked to testify here today on oversight on water resources in the West, I thought of several aspects of the problem that we should talk about, not the least of which is security at our facilities that our underway right now, the drought aspects, some of the infrastructure conditions that we are dealing with, and future for our water supply.

First, with all of the recent attention on security, let me emphasize that all Bureau of Reclamation facilities are secure. We remain at a high level of security at all of those facilities over the West and we have paid particular attention to those high visibility, high risk facilities such as Grand Coulee, Hoover, Shasta, Glen Canyon and a number of others that could get some particular attention. Our power facilities and water supply facilities are included in that vigilance.

With all of the work during this period in security areas, let me assure you that during that time we did not miss the delivery of a single acre-foot of water nor the generation of a single kilowatt hour of power. That system operated at its best during that time and we in reclamation were certainly proud of that.

In the near future, you will see reviews of security at all of our facilities. The President just this week signed a bill that gives us law enforcement authority at all of our facilities, and we do appreciate the Senate's action on that. It allows us to contract for the coverage of law enforcement at our facilities, which we did not have before.

In talking about drought for just a minute, a large portion of the Western United States is in the second or third year of a severe drought. Parts of the Columbia Basin this past year received just over 50 percent of their normal runoff. In other areas, the Rio Grande and the Pecos River received less than half of their water supplies this past year. California, Nevada, Utah, Colorado—all of those areas are still suffering from shortages of water this year.

The Bureau of Reclamation projects worked well in supplying needed water during that time. In most of the areas, drought contingency planning ahead of time helped prepare a lot of those areas for the worst. In some of those cases, we got the worst. Another year of short water supplies in those areas could be devastating to some of our water users. We are right now continuing to work on water conservation programs, on drought contingency planning in those areas, but in some places, it is probably not going to be enough. If we don't receive above-normal runoff in some of those areas next year could be a very tough year for a lot of those folks.

Now, our infrastructure around reclamation is an aging one. A lot of our facilities were built in the early 1900's. But Bureau of Reclamation facilities are being operated and maintained in a safe, reliable and sustainable manner. Our No. 1 priority in reclamation is, and I hope it always will be, to continue that. We have one of the best safety advantage programs in the world, and we are implementing it to ensure the safety of those facilities around the Western United States.

Our power operation and maintenance program with Bonneville Power Administration and the Western Power Administration are exceptional to get the most generation from all of our plants. We continue to supply irrigation water to over 10 million acres of farmland and domestic municipal and industrial water to more than 31 million people in the Western United States. Of course, we could use more dollars to work on and update these facilities, but we understand that dollars are short these days. Our programs will keep these facilities in a safe and operating mode with what we have for the time being.

Looking at the future, over the past next 25 years, population in 17 Western States has increased at 32 percent growth rate. That compares to an overall growth rate of about 19 percent in the rest of the United States. Nearly every water system in the West—the Colorado, the Columbia, the Missouri, the Rio Grande, the Great Basin—all of those are heavily developed and over-appropriated in most cases. This trend is expected to continue. It causes significant challenges to both the Bureau of Reclamation and other Federal, State and local water agencies.

Many irrigation and municipal industrial water delivery systems will require substantial improvements to meet current engineering standards and to enable beneficiaries to deliver and receive the water supplies they need in order to meet the rising demands in the future. New facilities to meet agriculture and municipal and industrial conversion may be needed. As one of the fastest growing regions in the United States, water that was once used for irrigation is increasingly being converted to municipal and industrial usage.

Because of the change in the location of usage, because of the changes in timing of when the water is needed currently, and because of the need for treatment of municipal and industrial water to make it potable, there is currently in insufficient infrastructure to meet these needs. In addition to converting the water from agriculture to municipal and industrial purposes, a new water supply will be needed to meet the growth of certain regions in the Western United States.

While Reclamation has a significant and diverse mission——

Senator GRAHAM. Mr. Keys.

Mr. KEYS. Yes, sir?

Senator GRAHAM. Could you summarize the balance of your statement and the full statement will, of course, be in the record.

Mr. KEYS. You bet.

The last point that I was going to make is one of the challenges we face is in meeting budgets to provide all of these facilities, and we would certainly be willing to work with our appropriations committees and those folks to provide those dollars. We would look forward to working with your subcommittee on the drought program and would certainly stand to answer any questions you may have.

Senator GRAHAM. Thank you very much, Mr. Keys.

Our next witness is Mr. Robert Hirsch, Assistant Director for Water of the U.S. Geological Survey.

Sir.

STATEMENT OF ROBERT HIRSCH, ASSOCIATE DIRECTOR FOR WATER, U.S. GEOLOGICAL SURVEY, DEPARTMENT OF INTERIOR

Mr. HIRSCH. Thank you, Mr. Chairman, and members of the subcommittee. Thank you for the opportunity to report on water supply issues from the perspective of the U.S. Geological Survey.

I am Robert Hirsch, and as Associate Director of the Survey, I am responsible for the water science programs of the USGS. Allow me to summarize my remarks and try to be as responsive as I can to your questions.

In response to your first question, I would say that the water supply situation has become much more complex in recent years. The Nation's water infrastructure was designed primarily to meet a set of demands for water for irrigation, municipal needs and industrial needs. Over the years, conditions have changed. For example, center-pivot irrigation systems have made irrigation more practical in many regions, and populations have shifted from northeast to the southern and Western parts of the Nation.

Of particular importance is the fact that water supply systems are now being called upon to provide water for in-stream uses that were not part of the original design requirements. What this means is that there is a rapidly increasing conflict and competition for water nationwide. We see this in arid regions and humid regions alike. Experience has shown, however, that application of science can help cope with the conflict.

To answer your second question, let me point out where science and the USGS science in particular can play a valuable role in resolving water supply problems. As competition gets stronger, there is a need for science that defines more precisely than ever the ac-

tual extent of the resource. We believe that the science of groundwater hydrology is crucial to water management not only in arid regions, but nationwide. Conjunctive use of surface and groundwater has great potential for making water supplies more drought-resistant. Groundwater is crucial to sustaining streamflow for habitat and for water supply. More and more, we find that our partners are asking us to explore the role the groundwater plays in maintaining adequate flow and temperature conditions in rivers.

Second, we conduct scientific studies to support the use of emerging technologies such as artificial recharge, aquifer storage and recovery, and recharge of reclaimed waste water as pivotal parts of the water management equation. The science to support the use of these new technologies is a part of our strategic plan for the future of USGS groundwater science.

Third, we provide hydrologic data that are crucial to the wise management of the resource and that support effective daily operational decisions, as well as long-term solutions. You will see a chart coming up in a moment here regarding our stream gages. We operate about 7,000 stream gages which monitor the flow of water in our Nation's rivers and streams. We freely provide the current and historical data to a wide range of users. This information is used for purposes that include water supply planning, flood risk assessment, water quality, water supply operations, streamflow forecasting, habitat assessment and personal planning of river-based recreational activities.

Currently, we are in the process of modernizing the stream gauging network, and at the present time about 5,000 of these stations have satellite telemetry that enables us to provide near real-time data to all users via the Internet. One of the information products that comes from the stream gauges is called "water watch." This is illustrated on the briefing board. These water-watch maps are constructed daily and are based on conditions for the preceding week at all the USGS stream gaging locations that have 30 or more years of record and have telemetry systems. Each dot on the map represents an individual gauge, and they are color-coded based on the long-term record of flows at that site for the particular time of year. The colors range from red, which indicates record-breaking low flows, to black indicating record-breaking highs.

The patterns seen on yesterday's map shows a broad area of very dry conditions from northern Florida through Maine; a very wet area centered in Indiana; another focused around the Red River of the north; and dry areas in the Northern Rockies and the coastal regions of Oregon and northern California.

Let me take a moment to mention four USGS programs most relevant to the water-supply question. First and foremost is the Cooperative Water Program that has been in existence for over 100 years. In this matching program, we cooperate with 1,400 State, local and tribal governments. In recent years, the non-Federal contributions have greatly exceeded the Federal share. Today, the program involves about $63 million in Federal funds and about $120 million in non-Federal funds. The work undertaken includes the collection of water data and regional studies and models.

Second, I would like to mention the Water Resources Research Institute Program. This cost-shared program is crucial to the devel-

opment of the expertise and assistance to State, local and Federal Government on water issues. Roy Mink from the Idaho Institute will be here to testify later.

Third, the Groundwater Resources Program conducts research on groundwater systems with an aim to providing a better overall characterization of the resource and better ability to predict how the resource will respond to stresses from development or climate change.

Finally, the National Streamflow Information Program is a newly focused effort to provide support for the stream gaging network that measures the pulse of the Nation's rivers. We have worked closely with the Congress over the past 3 years, and thanks to your support and the support of hundreds of State, local and tribal agencies and our Federal partners, particularly the Army Corps of Engineers and Bureau of Reclamation, we have made good progress in modernizing and stabilizing the network.

In response to your final question about congressional actions, let me simply acknowledge the strong support that Congress continues to show for these USGS water programs. I would also note that the USGS is currently preparing a report related to the topic of this hearing. It is being prepared in response to the following request from the House of Representatives Committee on Appropriations, and I quote from their report language:

> The Committee is concerned about the future of water availability for the Nation. Water is vital for the needs of growing communities, agriculture, energy production and critical ecosystems. Unfortunately, a nationwide assessment of water availability for the United States does not exist or at best is several decades old. The Committee directs that by January 31, 2002, the Survey prepare a report describing the scope and magnitude of the efforts needed to provide periodic assessments of the status and trends in the availability and use of fresh water resources.

We would be pleased to discuss this report with the committee at any time.

Thank you for asking me to testify today, and I would be glad to answer any questions you may have.

Senator GRAHAM. Mr. Hirsch, the report that you just referred to, when will that be available?

Mr. HIRSCH. It will be available at the end of January, but we would be happy to discuss it with the committee as we are wrapping up our process of preparing it.

Senator GRAHAM. I am very pleased to know of that. The timing fits exceptionally well with our intention to begin to develop legislation in this and other areas relative to water use at about that period in January. Thank you.

I would like to recognize the arrival of Senator Corzine of New Jersey, a member of our subcommittee. Senator Corzine, do you have any opening comments?

OPENING STATEMENT OF HON. JON S. CORZINE, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator CORZINE. Thank you, Mr. Chairman. I appreciate your holding this hearing on a very important topic to the Nation. Actually, I noticed in Mr. Hirsch's formal remarks a recognition of a growing drought problem along the East Coast and the Delaware River Basin in particular, which is particularly important to my

State of New Jersey, but the whole region. In questions, we will probe around a little more on that.

I think this is a vital issue of importance to all our communities and I appreciate your holding the hearing in preparation for us moving forward with legislation. I look forward to working with you. I have a formal statement I will put in the record.

Senator GRAHAM. Without objection.

Senator CORZINE. Thank you.

[The prepared statement of Senator Corzine follows:]

STATEMENT OF HON. JON S. CORZINE, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Thank you, Mr. Chairman. I want to thank you for holding this hearing on our Nation's current and future water supply.

My State of New Jersey has historically had adequate water supply thanks to its multiple rivers, substantial annual rainfall, and abundant groundwater. However, our status as the country's most densely populated State, as well as the 9th highest in population, means our water supplies are put under increasing stress. We now have areas approaching critical depletion. Future water supply management will require substantial investment in infrastructure and water resource development.

I look forward to hearing from today's panelists on the outlook for our Nation's water supply and what role the Federal Government can play in meeting our citizens' water supply needs.

Thank you, Mr. Chairman.

Senator GRAHAM. Thank you very much, Senator.

Mr. Tom Weber, Deputy Chief of Programs, Natural Resources Conservation Service of the Department of Agriculture.

Mr. Weber.

STATEMENT OF TOM WEBER, DEPUTY CHIEF OF PROGRAMS, NATURAL RESOURCES CONSERVATION SERVICE, DEPARTMENT OF AGRICULTURE

Mr. WEBER. Mr. Chairman and members of the subcommittee, thank you for the opportunity to appear here today and present views on behalf of the Department of Agriculture regarding water supply issues in our Nation.

America's farmers are among the most productive in the world, but increasingly around this country farmers and ranchers are facing an ever-increasing concern about both the quality and the quantity of water. Recently, the Secretary of Agriculture Ann Veneman released "Food and Agriculture Policy: Taking Stock for the New Century." This document is a long-term view of the Nation's agriculture and food system. We propose that the policies in this document not only buildupon the past gains in resource conservation, but must prepare us to respond to emerging challenges such as the link between water supply and agriculture.

This relationship is exemplified by the following facts. Nationwide, agriculture accounts for nearly 80 percent of all water consumption. A significant percentage of all cropland in the Western United States is irrigated. The 16 percent of the harvested cropland that is irrigated accounts for nearly one-half of the value of all crops sold. Nationwide, nearly all of our orchard sales and a majority of the sales of vegetables and potatoes are produced on irrigated cropland.

Demand for water is increasing, with added pressure from both municipal use and urbanization. We believe that Agriculture is

uniquely positioned to be part of the solution to the water issues. The Natural Resource Conservation Service helps farmers and ranchers with on-farm water management. Some examples of programs and activities that can help include the following. We believe the best approach is to begin with a conservation plan. That is where a conservationist works directly with a farmer or rancher to plan their natural resource needs, to address their needs, including irrigation water management, and assist them in providing the technical know-how to implement those plans.

The NRCS also offers valuable information to assist in resource planning, such as the snow survey and water supply forecasting program. This program provides for the Western States and Alaska information on seasonal availability of water from melting snowpack. This is through our system of automated snow telemetry equipment which provides weekly and monthly predictions of the resultant streamflows and is available as a web service.

The National Cooperative Soil Survey is also a partnership effort in which we inventory the Nation's soil resources. The Survey produces comprehensive maps, descriptions and interpretations that land users and others can use to make resource decisions based upon water availability.

In addition, the Natural Resources Conservation Service has the National Resources Inventory which gauges the condition and trends of natural resources around the Nation on over 800,000 sample sites, and also serves to provide analysis of those resource trends and impacts.

The Conservation Plant Materials Program identifies and distributes millions of native plants to address natural resource problems. As part of this effort, we evaluate drought tolerance of plants and work to develop these plants for the assisting of farmers and ranchers who face water shortages.

I would also like to mention a couple of incentive programs. The first is the Environmental Quality Incentive Program which provides technical, educational and financial assistance to farmers and ranchers to protect their natural resources. On-farm water conservation practices such as drip irrigation do provide dramatic reductions in water use, while maintaining productivity, and are in part financed through this program.

The Wetland Reserve Program also provides long-term drought prevention by protecting our wet areas—swamps and marshes—that helps to conserve and store water. The Small Watershed Program involves State and other public agencies in water and land treatment projects. These are used to enhance flood control, watershed management, water conservation, industrial and municipal water supply and fish and wildlife purposes.

We also have the Emergency Watershed Program which targets communities as opposed to individuals by relieving imminent threats to life and property caused by flood, fire, windstorm, drought and other natural occurrences. We believe this incentive and technical support programs can substantially improve on-farm water management and sound resource information can help make a difference.

When the Congress enacted the National Drought Policy Act of 1998, a 15-member advisory commission consisting of farmers,

ranchers and government officials and chaired by the Secretary of Agriculture did make several recommendations regarding NRCS technical assistance and funding for voluntary programs to help with drought mitigation. This commission also recommended expansion of the resource inventory technology capacity to assist.

I would conclude that even if we are not able to control the weather, conservation programs can play an important role in helping local people with the tools and assistance they need to mitigate the effects of water shortages.

I would be happy to answer any questions of the committee.

Thank you, Mr. Chairman.

Senator GRAHAM. Thank you very much, Mr. Weber.

Mr. Cook, who is representing the EPA today, will be available for questions, but I understand you do not have a statement. Is that correct, Mr. Cook?

Mr. COOK. That is correct, sir. I might just say for the record my name is Michael Cook and I am Director of the Office of Waste Water Management at EPA.

Senator GRAHAM. Thank you very much, Mr. Cook.

One question that I would like to start with is whether the drought that was outlined in the statistics I cited earlier and that several of you have mentioned in your presentations—is this a cyclical circumstance or do we have some reason to believe that the 21st century may be significantly different than the 20th century in terms of the natural production of the water upon which we depend? Mr. Hirsch, from the study that you have underway at the Geological Survey, what is your sense?

Mr. HIRSCH. Thank you for the question. It is always very difficult to make any prognostications about what precipitation or flow availability will do in the future. Even looking backward in time, I think what we find is a very episodic nature—episodic meaning periods of several years of departures toward very wet conditions on one hand or dry conditions on the other, and not really a cyclic pattern, but a kind of a variation from one to the other.

One of the things we do see is that actually low flows in rivers have tended to be increasing across the Nation over much of the last century, and high flows have stayed relatively the same. We don't see any clear pattern of a climatic shift occurring that would portend a very different sort of climate for the next century, particularly as it relates to water resources.

Senator GRAHAM. Any other members of the panel have any comment on the question of is this a more or less conventional cycle of weather, or do the drought conditions that we have been experiencing for the past several years represent a more fundamental shift in climate?

Mr. Keys, you referred to a set of statistics relative to increase in public supply water use in the United States. Those statistics indicate that between 1980 and 1995 on average the United States increased its use of public supply water by 16 percent, but there were 16 States that more than doubled that percentage increase. Of those 16 States, 7 were States that were within the jurisdiction of the Bureau of Reclamation and 9 were in States that were not in the Bureau of Reclamation's jurisdiction.

The jurisdiction of the Bureau of Reclamation is largely based on the water patterns of the United States in the 19th and the early part of the 20th century where we had a relatively wet East and a dry West. Now that we are having other factors that are beginning to influence water supply and use that are causing States in the East to begin to experience some of the restrictions that were previously a western phenomenon. Based on your experience at the Bureau of Reclamation, do you have any advice for those States outside of your jurisdiction that are now beginning to experience the type of water limitations that have been historic in the West?

Mr. KEYS. Mr. Chairman, that is a heck of a question. I would just say that we work very closely with the other agencies—the Corps of Engineers, the U.S. Geological Service—in trying to supply waters to all of those areas. The populations have built up around the project areas that Reclamation worked on in the early part of the 19th century. One of the biggest challenges to us right now is the conversion from those irrigation water supplies to municipal supplies to meet the demand brought on by a lot more people.

One of those statistics that I talked about is the more than 30 percent increase over the past 20 to 30 years in population there. We have been working with the Corps and with the NRCS in those areas to try to make those conversions and still supply the irrigation waters.

Do I have advice for the other Federal agencies? I think the only advice that I would give is to be sure that we are still working together, because they have their authorities, we have our areas, and certainly I think together we can meet the challenge.

Senator GRAHAM. That is a very encouraging, optimistic assessment of the future. I am hopeful that that will be the case.

Mr. Parker, what have been in the Corps' experience the most encouraging developments in terms of means by which we can manage our water supply more effectively? For example, I notice that the State of Georgia, in conjunction with the Corps, is now considering adding a series of new reservoirs, particularly on the Flint River in order to better manage their water supply. What has been the Corps' experience as to the most effective specific or combination of management techniques for purposes of water supply?

Mr. PARKER. Senator, I think that the biggest thing is the realization of people around this country that there is a definite problem. More and more people understand that they have to take some action in order to offset that. What is interesting is it is spotty across the country. If you look at the State of Texas, they have taken some steps as far as looking at their entire State and seeing the problem; looking at it from a regional standpoint instead of a local standpoint. California has done a good job.

In other States, not the entire State looks at it. In other areas of the country, it may be a county or a municipality that looks at it. More people realize that it is a national problem. We need to look at it in a regional way. The Everglades is a perfect example. Georgia is a good example. But you've got to look at it in a regional way and you've got to bring together all of the different agencies to bear on the Federal side, but also on the local side. Whenever you do that, if they start early enough in making decisions and

making plans, then they are able to not have some of the problems that others have had, if they have that integration early on.

I think that that is the way we are going to solve this problem, is that people have got to realize we have got to have a national priority, we have to have a national plan, and that is has to be regional in nature and that everyone has got to cooperate to make this thing work, but they've got to start planning together early to make it happen. We see good examples of that all over the country.

Senator GRAHAM. Would you suggest that in the legislation that we are going to be drafting that we should give some encouragement to States to look from a regional perspective at their water supply needs and options to meet future demands?

Mr. PARKER. I think you have to. I think that you are in a situation now, especially because of some of the problems in the country, where as Federal agencies we have got to make it easy for people to deal with us and be able to put together those plans. We have situations I am running into now in the Corps where we have people that have come along and the Corps wasn't involved until later on in the process. You know, they started making plans; spent a lot of money—in fact, wasted money, because if they had just planned properly, they could have saved themselves a lot of time and trouble, and a lot of their water problems would be solved.

There has got to be more coordination, and the Federal Government is the only entity out there that can bring that coordination to bear—not forcing their will on local municipalities or local governments, but at least providing access to the information they need.

Senator GRAHAM. Mr. Cook, last year the Congress passed a pilot program which was to provide assistance to States and local communities for the development of alternative water sources. I recognize that that legislation was passed too late last year to receive an appropriation. Hopefully, there will be funds available for the next fiscal year. Could you describe what is the status within EPA of the commencement of planning to implement that program?

Mr. COOK. Yes, sir. We set up a task force and initiated a concept paper on implementation, and then basically put that on hold when it became apparent there was not going to be an appropriation under that authority. We do continue to administer both our State revolving funds programs and also substantial grants programs to provide assistance for reuse and recycling and have provided a great deal of that over time, including in the State of Florida.

Senator GRAHAM. Has your initial work proceeded to the point that you have developed some criteria of what you will be looking for in alternative water source projects to be funded?

Mr. COOK. No, not anything other than what was in the statutory language itself.

Senator GRAHAM. Mr. Weber, several of our colleagues are not with us now because they are on the Agriculture Committee and they are involved in a markup. I know that one of the titles of that legislation deals with conservation, including water conservation. Are there any recommendations that the Department of Agriculture is making to the Congress as it writes the 2001 Farm bill that relate specifically to the issue of availability of water for agriculture and other purposes?

Mr. WEBER. Thank you, Mr. Chairman.

I am not aware of any specific recommendations other than what are in Secretary Veneman's Ag policy document, which does speak to water conservation as being a substantial issue from a resource protection and enhancement standpoint.

Senator GRAHAM. Are there any particularly encouraging practices that are currently underway that you think should be encouraged on a broader basis? Or are there new not yet fully tested areas or tactics for water supply that you think should be researched and developed on an operational basis?

Mr. WEBER. Mr. Chairman, I really believe there are tremendous technologies already available for a substantial improvement of efficiency of irrigation water management on agricultural lands, many of which are applied and can be applied to other land uses—things such a drip-irrigation systems, which are used heavily out in the western part of the country and some other parts of the country for fruits, vegetables, vineyards and those kinds of specialty crops; the underground irrigation systems that substantially improve the efficiency of water use. There are just a number of outstanding technologies that have been developed both from the government research side, as well as the private sector, that are available. It is an issue of management of these technologies, and also the capital investment needed to convert from other forms of irrigation that do pose some challenges, and that is where some of our financial assistance programs can assist agricultural producers.

Senator GRAHAM. Is it primarily a State responsibility to facilitate or even mandate the use of these more efficient irrigation systems for agriculture?

Mr. WEBER. From the USDA perspective, that would be a State or local responsibility to require any kind of conversion from existing irrigation to more efficient. Obviously, we work with those local folks, as well as landowners and those State units of government to help provide the technical know-how to facilitate that, as well as the financial assistance to help the conversion.

Senator GRAHAM. Senator Corzine asked if I would ask to the panel a question relative to the status of desalinization as a means of generating fresh water supply. Mr. Cook or any member of the panel who has some thoughts about what is the state of the science of desalinization?

Mr. COOK. I guess in short, desalinization is being practiced particularly in Florida, to give a prime example, but also in other water-short areas. We at this point find the costs are coming down, though it is still quite a costly technology and is preferable to have a fresh water supply.

Mr. KEYS. Mr. Chairman, I might add that Reclamation has technical expertise in de-salting and are actually working with some projects on the ground right now. We have an agreement with Sandia Lab to do some research in the New Mexico area. I also know that the city of El Paso is moving into construction of a de-salting plant there in coordination with the Army base that is right close. So there are some things underway working with some of these folks. We have some good expertise out there.

Senator GRAHAM. Mr. Cook, I would like to go back to that legislation that Congress passed last year. At a hearing on that legisla-

tion prior to its enactment, the EPA testified that the Safe Drinking Water Act's State revolving fund should be used to meet State needs for augmentation of water supply. At that same hearing, it was established that the hierarchy of purposes for the State for the Safe Drinking Water Program did not include alternative water source development as one of its purposes. If it is still the EPA's position that water supply needs should be met through the Safe Drinking Water Act, do you have some recommendations of how that Act should be modified in order to make it available for purposes of the development of water supply?

Mr. COOK. It continues, I think, to be both legislative and our policy to try to focus the drinking water SRF loans on improving the quality of what is delivered, as opposed to improving increasing the quantity. However, we do have the Clean Water State Revolving Fund which can and is being used on a large scale for projects that involve reuse and recycling of waste water. It is being used for high levels of treatment of sewage. It is being used for storm water management, which is eventually reinjected to reused in some fashion.

So we actually have a very active program going on in this area, and it could be expanded easily if some States that have not to date funded these kind of projects simply changed their priorities somewhat. So I do not at this time see a need for a legislative change to the Drinking Water SRF when we have the clean water SRF which at this point has a much, much higher capitalization. It is capitalized at this point at over $80 billion nationwide. I don't see a need for changing the drinking water SRF when we have the clean water SRF.

Senator GRAHAM. Gentlemen, thank you very much for this very helpful and instructive discussion of our water supply needs. As I indicated, early in the next year we will commence the process of trying to take these ideas and incorporate them into legislation, and we look forward to the opportunity to continue to work with each of you in that process.

Thank you very much, and I apologize for that interruption.

Our first witness on the second panel will be Ms. Ane Diester, who is associate vice president of the Metropolitan Water District of southern California. She is the agency spokesperson on conservation, drought management, water reliability and environmental issues, all of which the core of our hearing today.

I am pleased to say that Ms. Diester has some Florida roots. Before going to California, she was appointed special assistant-executive director of the south Florida Water Management District.

Did you go to California with Woody Woodraski?

Ms. DIESTER. No, he followed me.

Senator GRAHAM. He followed you.

[Laughter.]

Senator GRAHAM. Our second panelist will be Mr. Jay Rutherford, who is head of the Water Supply Division of the Vermont Department of Environmental Conservation, and has already been introduced by Senator Jeffords.

Our third witness is Mr. Ken Frederick, Senior Fellow with the Resources for the Future. He has been a member of the research staff there since 1971 and has done research and writing on eco-

nomic, environmental and institutional aspects of water resource use and management, and the potential impacts of climate change on the supply and demand for water.

Mr. Leland Roy Mink, director of the Idaho Water Resource Research Institute and past president of the Board of the Water Resource Institute. Mr. Mink has also been previously introduced by Senator Crapo.

Thank each of you for having made the effort to assist us in understanding issues of water supply. I look forward to hearing each of you testimoneys. We are requesting that testimony be restrained to 5 minutes.

If you have a longer statement, that will be part of the printed record.

Ms. Diester.

STATEMENT OF ANE DIESTER, ASSOCIATE VICE PRESIDENT, METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Ms. DIESTER. Thank you, Mr. Chairman. It is a pleasure to be here today and to make these comments on this important topic, water supply.

I have submitted comments for the record, and I believe you probably have a copy of those.

In addition to my Metropolitan duties, I am also the non-Federal chair of the National Drought Council, and I previously served as the Urban Water Representative on the National Drought Policy Commission.

Lately, and as recent as this morning, there has been some discussion about water supply and security. Over the past couple of years, there has been a great deal of discussion about infrastructure. But the topic of today's hearing focuses on what I think is the most basic issue and the one we need to really address, basically our water resource supplies nationally.

Searching for the answer from many sources to your three questions, I used the National Job Policy Commission final report which we submitted to Congress last year, and also the Scientific American article which came out in February of this year which featured a whole tapped out series of articles. I also looked at a lot of Army Corps documents, USGS documents and data, the World Water Commission reports, American Waterworks Association documents and papers, and numerous other scientific articles.

What all of these sources have suggested is something I think we all know intuitively, and that is that fresh water is limited and the demands are going up.

In my written comments, I have also provided some worldwide water statistics and a State by State snapshot of water supply availability for every State in the Union. In almost every one of the States, they are either facing now or about to face or have just recently faced some sort of supply shortage. Groundwater basins are being over-drafted. Conservation measures that have cushioned growth demands and dry weather conditions are becoming hardened, and increases in salt concentrations are beginning to limit recycling applications.

In places where there are Federal water supply facilities, allocations are being exceeded and conflicts are rising. In the past few

years, scientists and water policy specialists, at least out in the West, are beginning to interpret the real world impacts of climate change on water resource systems.

So the short answer to your first question that you posed is yes, there is a water supply challenge today, and it is growing into a first class problem for the future. The potential causes are described in my written comments, but I am just going to hit them—just their titles today: natural resource limits; changing climate conditions and the uncertainties that that brings; ever-increasing water quality constraints and associated treatment impacts; growing demands and competition for resource supplies—and I'm certain regarding population growth, we found we have seven different projections for population growth in California, and the numbers range by about 20 million and it is hard to plan for that; the need for regional integrated resource plans throughout the country using both structural and non-structural solutions; the need for coordinated Federal water resource management policies, approaches and priorities; and the need for coordinated technical data collection, especially in the monitoring and prediction area; waste water use estimates and conservation and recycling advancements; the need for official, coordinated Federal conflict resolution practices; and the need for a shift in Federal funding priorities from response to readiness, emphasizing planning and preparedness.

Question No. 2, asked about the effectiveness of the Federal programs in ensuring that State and local governments are meeting water supply needs. The answer I just gave to the first question really hits five of those need areas which directly relate to the Federal Government's role. Collectively, they relate to the need to reevaluate the ability of any single Federal agency to veto coordinated and collaborative plans which are put together to meet water supply needs.

It also calls on the Federal program managers to work cooperatively within their existing jurisdictions and authorities in a participatory and transparent manner, and admittedly that is easier said than done. But as difficult as this task is, we can look to California's CALFED program and Florida's Everglades Restoration Program and many of EPA's National Estuary Programs for examples and successes and many lessons learned.

Question No. 3, asked what actions Congress should take. I would begin with some general comments. First, begin by looking at some Federal-non-Federal collaborations that have worked and are still working. One of those is the Western Drought Coordinating Council; the Western Governors Association, and the Governor of New Mexico really spearheaded that; the National Drought Policy Commission, where I served along with the secretaries of many of the Federal agencies, private sector and many stakeholders; and now the National Drought Council. Then develop incentives for other collaborations like that to happen throughout the country, especially at the regional level.

One way to do that is to support the national drought planning and preparedness legislation that the Western Governors Association is working on with Senator Pete Domenici. Included in that support is the administrative and implementation funding which

that bill will have. They will be introducing that bill I believe in January 2002. Also, make sure that the National Drought Policy Commission report recommendations are implemented in that bill.

Basically, it talks about shifting Federal priorities from response to planning, especially in the funding area. Provide incentives for scientists to share data and collaborate. In my attachments to my written comments, I have got a copy of the drought monitor map and report that USDA and NOAA and Rural Climate Centers and USGS and a number of Federal agencies and regional groups are putting together in a collaborative fashion.

Develop and enact a Federal practice of multi-jurisdictional conflict resolution. Also conduct a national assessment of the potential for regional watershed base-water management programs, which also include stakeholder input processes. I did include in my written comments some specific recommendations related to the Safe Drinking Water Act, the Clean Water Act, and the Endangered Species Act which further address these general comments.

I am happy to answer any questions at the right time.

Senator GRAHAM. Thank you very much.

Mr. Rutherford.

STATEMENT OF JAY RUTHERFORD, DIRECTOR, WATER SUPPLY DIVISION, VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Mr. RUTHERFORD. Thank you, Mr. Chairman. Good morning.

I would like to thank Senator Jeffords for his introduction.

Although I am a State employee, I am here today to speak to you on behalf of the Association of State Drinking Water Administrators, which represents the drinking water programs in the 50 States, the territories and the District of Columbia in their efforts to provide safe, potable drinking water to all Americans. The Association's primary mission is the protection of public health through the effective management of those programs that implement the Safe Drinking Water Act.

In the 27 years since the passage of the Act, State drinking water administrators have been primarily involved in drinking water quality issues, less so with quantity, although a reliable source of drinking water is a prerequisite for good public health protection.

The Association's members regulate public drinking water systems, which are those that serve 25 or more people per day. Public water systems have the benefit of both Federal and State regulation, and this oversight typically provides for improved source protection, planning and operation of those systems to the benefit of their customers.

Mr. Chairman, in response to the questions that you posed in your invitation, we polled our member States over the weekend regarding the adequacy or capacity of their public water supplies. The responding States affirmed that each State's situation is unique, so I will necessarily speak generally about this matter. There are four points I would like to address.

The first is that the States confirmed what we can see from the national drought maps, which is that declared drought conditions exist in all or portions of approximately half the States, and that

these conditions do affect the supply of available drinking water, but to varying degrees.

Second, from our members' perspective, the primary cause of these stresses is weather-related—lack of rainfall or snowpack. Some States also reported stresses attributable to population growth; to competition for use among agricultural, manufacturing and environmental initiatives; and did report that development was stressing some supplies in some areas, although this issue was less significant than the stresses caused by the weather.

The third point is that most States are developing or have developed management systems to address the reliability of the water supply. These efforts usually involve multiple State, Federal and local agencies. In some States, water supply management is a requirement on the systems; in others, recommended.

Finally, fourth, about half the States' drinking water programs are administered through their health departments and about half through the environmental departments. This distinction has led to a variety of lead agencies addressing water supply issues.

The second question in your invitation requested an assessment of Federal programs' effectiveness in ensuring that State and local governments are meeting water supply demands. This is a difficult question to answer due to those unique circumstances in each State. The drinking water programs are generally involved in water supply matters, commonly as part of larger interagency efforts. In the Western States there is clearly a strong Federal-State relationship as well.

The Source Water Assessment and Delineation Program in the 1996 amendments to the Safe Drinking Water Act have given States a lot of flexibility to approach source water protection in ways that meet local needs and conditions. We feel that this is a good model for State and Federal cooperation.

The overall message from the States, however, is that water supply matters are primarily State and local issues and the Federal involvement with the States should be limited to a facilitative or helping role in meeting the interests of those States.

With respect to your third question regarding recommendations for the role of Congress in this matter, we suggest that the flexibility contained in the 1996 amendments to the Act is an excellent approach. The Drinking Water State Revolving Fund, in particular, provides States with the flexibility to creatively apply set-aside funds in ways that make the most sense to each State in the program. Additional support for the Fund would further enhance the Program's ability to carry out this work, and we encourage such support.

I thank you very much for the invitation to be here today and would be happy to answer any questions.

Senator GRAHAM. Thank you very much, Mr. Rutherford.

Mr. Frederick.

STATEMENT OF KEN FREDERICK, SENIOR FELLOW, RESOURCES FOR THE FUTURE

Mr. FREDERICK. Thank you, Mr. Chairman.

Concerns about the availability of fresh water to meet the demands of a growing and increasingly affluent population, while

sustaining a healthy natural environment, are based on several factors. My remarks here I will address only two of these: the implications of a greenhouse warming and the shortcomings of our institutions for allocating scarce supplies in response to changing supply and demand conditions.

Greenhouse warming could affect the quantity, quality, timing, location and reliability of water supplies. The effects on water supply supplies and water management systems are expected to be among the most important impacts of global warming. But understanding the linkages between emissions of greenhouse gases and the climate, and then determining how climate change would affect water resources at geographic scales relevant for planning and management are daunting tasks.

While there is a very wide range of hydrologic projections that come out of the different climate models, it makes it very difficult to draw any conclusions at these river basin levels. Some general conclusions about the likely impacts of global warming on water supplies do emerge from the research. Higher evapotranspiration rates may lead to decreases in runoff, even in areas with increased precipitation. More intense precipitation days are likely in some regions, which could contribute to an increase in flood frequency. The frequency and severity of droughts could increase in some areas as a result of a decrease in total rainfall, more frequent dry spells and greater evapotranspiration.

Higher temperatures would shift the relative amounts of snow and rain, along with the timing of runoff in mountainous areas. This shift could increase the likelihood of flooding early in the year and reduce the availability of water during periods off high demand. The quality and quantity of fresh water in coastal areas might be adversely affected by higher sea levels and increased storm surges that push salt water further inland in rivers, deltas and coastal aquifers.

Looking at the water institutions, there is cause for concern over the adequacy of our supplies. We have limited control over the resource. Most opportunities for increasing supplies are financially and environmentally costly. Current uses are depleting or contaminating some valued supplies, and the prospect of climate change introduces new uncertainties.

Meanwhile, the demands for fresh water are growing with population and income. Many of the institutions that provide the opportunities and incentives to use, conserve or protect the resource continue to be rooted in a era when the resource was not considered to be scarce.

On the other hand, there is reason for optimism as to the long-term adequacy of water supplies. The institutions that influence how supplies are managed and allocated among competing uses and the effectiveness and cost of efforts to protect aquatic environments and drinking water quality will determine the magnitude and the nature of future water costs.

State institutions are primarily responsible for allocating waters within their borders, but waterflows do not conform to State boundaries. As the competition for water increases, all users within a hydrologic unit become increasingly interdependent. Consequently,

Federal input is needed to promote water use efficiency and protect the interests of downstream States.

The Federal Government currently manages much of the West's surface water supplies, supplies water to about one-quarter of the irrigated lands in the West, and is the source and enforcer of environmental legislation affecting water use, the trustee of Indian water rights and the holder of unquantified rights for water use on Federal lands. Carrying out these responsibilities to better meet the Nation's future water needs will be a major challenge.

I offer just a few recommendations. Water marketing, which involves the voluntary transfer of rights to new uses and users, has great potential to increase water use efficiency. However, the Federal Government has taken a few steps to facilitate water marketing, but to date they have had little impact, and I think a much broader and active Federal role is needed.

My remarks make a few other suggestions. Basically, I think in regard to water quality, we need to introduce more cost-effective approaches to meet our water quality needs. It might include effluent fees that provide incentives to develop and adopt least-cost technologies, tradeable permits to pollute that establish an allowable quantity of pollution in watersheds, and provide incentives to achieve this level at the lowest cost.

The interdependencies among water users and the interchangeability of ground and surface supplies are all too often ignored in management decisions because natural hydrologic regions have split into multiple political and administrative units. Integrated management of existing supplies and infrastructure, ideally at the river basin level, would also at the level of smaller watersheds, could be a cost-effective means of increasing reliable supplies.

Perhaps the most important measure that Congress could take to meet the Nation's long-term water needs would be to restore the Water Resources Council or a similar institution. Such an institution is needed to evaluate water investment and management decisions objectively from the perspective of their impacts on larger watersheds, to assess the third party impacts of interstate transfers, to counter the often conflicting objectives of differing Federal agencies, and to reduce or at least expose the inefficiencies that result from political log-rolling and agency aggrandizement.

I thank you and I am pleased to address any questions that you have.

Senator GRAHAM. Thank you very much, Mr. Frederick.

Mr. Mink.

STATEMENT OF LELAND ROY MINK, DIRECTOR, IDAHO WATER RESOURCES RESEARCH INSTITUTE

Mr. MINK. Thank you, Mr. Chairman.

I also wish to thank Senator Crapo for his earlier introduction.

As he mentioned earlier, I am past president of the National Institutes for Water Resources and a member of that board at this time. The National Institutes for Water Resources represents the State water resource institutes which are partners among State universities; Federal, State and local governments; businesses and industries. It also works with nongovernment organizations aimed

at solving water problems of supply and water quality at the local, State, regional and national levels.

By way of background, the Water Resource Research Act of 1964 authorized establishment of a Water Resource Research and Technology Center to be led by a land grant university within each State. These institutes are charged with arranging competent research that addresses water problems or expands the understanding of water and water-related phenomena; also aiding the entry of new research scientists into the water resource fields; helping train future water scientists and engineers; and getting results of sponsored research to the water managers and to the public. The institute in each State is responsible for working with researchers at other universities within their respective States.

Congress passed Public Law 106–374 last year. This legislation reauthorized the Water Resource Research Act through the year 2005. The legislation is under jurisdiction of the Committee on Environment and Public Works, and Senator Crapo was one of the major sponsors of last year's reauthorization and I wish to thank him for that. The State Water Research Institute Program is under the general guidance of the Secretary of Interior and is administered through the U.S. Geologic Survey.

Over the past 40 or more years, several reports have been submitted to Congress attempting to address the questions of, do we have enough water, and are we running out of water? Interestingly, the Senate Select Committee on National Water Resources, the so-called Kerr Committee, provided one of the earlier reports in 1961, over 35 years ago. Two other major assessments were conducted in 1965 and 1978 by the Water Resource Council. Just this last year, the National Research Council of the National Academy of Sciences issued a brief report on the research information and needs for assessing water availability and use.

If you look through, all of these studies consistently indicate an inadequate water supply to meet future needs. They have suggested ways to potentially develop more resources. An example of that is waste water reuse, desalinization, water conservation, among other recommendations. The studies also indicated the need for hydrologic data to develop information and to develop management plans and better able to make management decisions. This all leads to developing the information and techniques to make better forecasts, especially as related to extreme conditions such as drought periods and flood frequency.

In Idaho, as many of the Western States, water management has changed over the last 30 years, especially with the addition of new priorities. Early management strategy was to create more storage so water could be made available for basic needs of hydropower, food production and domestic consumption and use. During the past 30 years, a shift has occurred to add consideration of environmental concerns as a primary and a major needs. Primary examples or examples of this include minimum streamflows for aquatic species, which are important in our area to salmon and other fisheries; and also recreation in streams and rivers which has become an important consideration driving managing streams and reservoirs which have primarily been used traditionally for hydro-

power and irrigation purposes, to include these new uses that the public is demanding.

As more diverse population growth occurs in the Western States, new priorities surface for the available water. As a result, the perception and often reality is there is not enough water to satisfy the existing and projected demands. We feel the major issue facing water managers in the 21st century will be inadequate and uncertain water supplies.

Demands on the Nation's water resources are growing with increased population and industrial expansion. Since the supply is unchanged, with the exception of some potential climate impact changes, it indicates that we face increased challenges in meeting the growing demands. The degree of the problem or challenge is certainly associated with different regions of the country. Initially, the challenges are addressed by reallocation of water among competing demands, with higher demands—in other words, potable water use, drinking water—being supplied by discontinuing lower value uses such as irrigation.

This reallocation has social, economic and hydrologic effects and should be thoroughly and carefully evaluated. In some portions of the country, there are few alternatives for reallocation or alternative supplies. It is certainly important for the Federal Government to understand that demand is exceeding supply. Likewise, Federal agencies must work with States and local communities to develop alternatives to meet these existing and projected water demands.

Taking the fact that the past national water supply studies have been rather quantitative and describe large basins, local and State water managers feel these projections in some cases have been of little use. These past national assessments have been mainly quantitative, being understood by engineers and hydrologists, but being of limited value to other professions such as social scientists.

Many water managers in the West feel information and research certainly needs to be continued, and there is a Federal role in supporting this effort. Information needs to be targeted to users not only at the Federal levels, but at State and regional levels. There is also a strong feeling in the West that water management decisions are best made at these levels. Water information related to water quantity and quality should be designed to help meet the needs of these State and regional issues. That was cited back in a 1988 study, that the use of assessment means that its costs are justified by the benefits received by the users. These benefits should extend beyond the needs of just the Federal agencies.

There are several recommendations that we have made with respect to Congress' role in evaluating potential for water supply through the Nation. These include development of improved and new innovative supply enhancing technology such as the waste water reuse area. We have not been very effective in reusing waste water and it is a source we feel can be used. We need to develop innovative technologies to prevent pollution. When we have a polluted water source, essentially it is not used for many beneficial uses.

We need to increase the ability to forecast water availability and future impacts such as climate change and land use impacts on

water supplies; encourage the support of regional and State water planning. We also need to support hydrologic data collection at the Federal level and have this information available to State and local agencies and groups. We need to encourage and support the regional characterization studies both in high population and in rural areas.

In conclusion, I know that my fellow Water Resource Research Institute directors commend Congress for the recommendations contained in the fiscal year 2002 Interior Appropriations Act. This Act directs the USGS to undertake a report describing the scope and magnitude of efforts to provide periodic assessments of the status and trends in the availability and use of fresh water resources. This was mentioned by Bob Hirsch in his testimony.

In addition, we also support the congressional recommendation for the National Academy of Science's study to examine Federal and non-Federal water resources research funding and allocation of the resources currently deployed to support the water programs. This seems to be a logical way to develop and understand whether we as a Nation are making an adequate investment in our water resources research.

I have included several examples of State activities conducted by the water institutes in my written testimony, and I wish to thank you for your interest in this important matter and allowing me the privilege to speak.

Senator GRAHAM. Thank you very much, Mr. Mink.

Ms. Diester, from your work, for instance, on the Drought Policy Council, have you identified any specific actions that you think the Federal Government should initiate or expand current programs to deal with the issue of water supply?

Ms. DIESTER. Yes, sir. We actually have a whole list of recommendations in our summary report. We look at a couple of different areas. One is in the formal collaborative kinds of processes among Federal agencies, appointing coordinating councils or coordinating bodies or coordinating commissions with specific duties and responsibilities with shared information, shared visioning. Have some sort of funding mechanism that encourages that sharing.

For example, everybody here has talked about the need for coordinated information—technical information, scientific information. One of the things that we did is that we worked with USDA and NOAA initially because they both had weather-predicting abilities. We asked them, what would happen if you two worked together? After everybody got up off the floor, they decided that it was probably a good idea to look into that.

We actually have brought in rural climate resources and local climate resources, and we have done that incrementally, and we created a process where every Thursday one of the Federal agencies—they rotate who is the lead in writing up the written comments—and they put out the drought map, the National Drought Monitor every Thursday with written comments. That's a good example. But you've got USGS that often needs State cosponsorship for their stream gages. That should never be a question. That is basic data and it needs to be fed in. USGS needs to be supported and they need to be fed into a coordinated data management system.

So that is a key one—monitoring and prediction, forecasting and coordination.

Another area is in the creation of an ongoing body which we call the National Drought Council, but it could be called anything. It could be Water Supply Management Council or something, that is funded with key Federal roles—who is in the lead role, which agency is in the lead role, identified. Currently, USDA is playing that role with the National Drought Council; and have implementation money in there for preparedness plans; and a safety net so that people who want to shift from response kinds of programs to readiness kinds of programs have maybe a 5-, 6-, 7-, or 10-year kind of transition period. We have documented all kinds of cost benefit of doing that.

You pay for it in the back end, it costs three, four, five times. If you pay for it in the front end in terms of planning, like we do in southern California, you don't have those impacts and it saves a lot.

Long answer.

Senator GRAHAM. I would like to suggest a policy question and ask any of the members of the panel who would like to comment on it. One of the arguments against Federal involvement in water supply is that the expectation is that that involvement will result in enhanced supply, and therefore will facilitate additional growth into an area. You could argue that water supply naturally ought to be treated as one of the fundamental restraints on growth—a means of directing which parts of the country can accommodate population increase.

With that issue, is it appropriate for the Federal Government to be involved in augmenting water supply beyond that which nature is going to do? Would the consequences of such a Federal role be to distort land use and demographic patterns?

Ms. DIESTER. I'll jump in. You are probably tired of hearing from me, but one of the things that we discovered in looking at the Federal role is that so much money is spent on response efforts in terms of floods, and bailouts in terms of crop impacts. If you take that money that is right now designated for impacts, and you shift it. In California, we see flood as simply the resource that we need for the dry periods. So we think of it as an opportunity instead of a problem. If you manage water that way, then you actually are maximizing the use of water.

With respect to the issue of growth inducing, in some cases that probably is true; that increased water supplies would provide new growth. But the way to deal with that is to look at places like the State of Florida with the Growth Management Act of the 1980's, which really looks at the comprehensive land use and water use—you know that one very well—where you make those decisions based on the integrated process of land and water management, and not use one resource to sort of back-door a policy.

Senator GRAHAM. Any other members of the panel who wish to comment on that question?

Mr. FREDERICK. I will make a few comments. I don't think historically water has been a very good indicator of where people are going to go. Certainly, we have had no trouble filling up our deserts and southern California with people. Santa Barbara is an area that

I think attempted to limit development and growth by restricting access to water supply—a policy which ran into a lot of problems then in the early 1990's when they had a very prolonged drought.

It seems to me that the Federal Government is involved in water in so many areas and so many ways that the need for coming up with better ways to allocate the water in response to changing conditions, and also to come up with ways for protecting the ecosystems which are very important for the long-term quality of the water and availability of water, is an important government role. I guess I don't see that as a legitimate reason for not getting involved, as being one that is going to encourage excessive growth.

People are going to somewhere, and if we can improve the availability and the cleanliness of the water, I am sure that will probably have some effect, but it seems to me that would be a positive.

Senator GRAHAM. Mr. Rutherford, you come from the New England area where you have a cluster of States also with a long common boundary with Canada. Are there any particular water supply issues that are a function of the political composition of the New England region of the United States? I ask that question from the background of someone who comes from a peninsula State where, with a few exceptions, we are relatively autonomous in our ability to influence water issues. It would seem to me that in New England, you are particularly integrated across political boundaries, including an international political boundary. I was curious as to whether there are any particular issues of water supply that are a function of that political geography?

Mr. RUTHERFORD. As you have probably heard from the testimony, I speak from perhaps a narrower perspective than some of the other folks who testified. But within the drinking water realm, I would say that within the United States, we do not have significant issues due to our being together. All the States work together, meet periodically throughout the course of the year, and address common issues associated with drinking water. We do not have a deep relationship on the Canadian side of the border, unless we have a crisis that might occur in either Quebec or in one of the States, where we typically do have communication links to work together.

So I think our compactness and closeness, while perhaps might create some friction, in fact the ease of communicating from my perspective is that we have worked quite well together, and do not have any significant issues because of that closeness.

Senator GRAHAM. Mr. Frederick, you used the term "water marketing" in your statement. Could you elaborate on that?

Mr. FREDERICK. I was referring to the voluntary transfers of water, and I mean, water marketing is increasing significantly in the Western States. Initially, it started in a significant way with water banks in California during the drought, first in the 1980's and then in the early 1990's. I think water marketing provides a way of transferring water from what are relatively low value uses to the higher value uses. It also provides a way of introducing incentives for irrigators to conserve. If they have no opportunity to do anything else with their water, they have limited incentive to adopt some of the more water conservation technologies that were

referred to in the earlier panel. So I think it is certainly important from that perspective.

You look at the enormous differences in the values of water—take California, for example, where a very sizable part of the water is used for relatively low-value crops. Then you've got urban areas that are spending an order of magnitude more to develop new supplies. It seems to me that this is going to become an increasingly important means of responding to changing supply and demand conditions.

I also think that there is quite a bit the Federal Government can do to promote that, because a lot of this low value irrigation water is supplied by Federal facilities.

Senator GRAHAM. What would you recommend might be some of the ways in which the Federal Government could encourage the use of water marketing or other means of injecting a financial discipline on the use of water?

Mr. FREDERICK. Well, let me mention a couple. One has to do with Indian water rights. I think it is important. One of the problems, or an important problem for encouraging markets is the lack of clearly identified water rights. To the extent that you can identify, accelerate the process of identifying the Indian water rights, but then making sure that the Indians are able to market the water off the reservation, I think is a very important measure. In 1992, there was legislation passed which made some of the water from the Federal Central Valley Project could be marketed. To my understanding, there actually hasn't been any marketing, but I think that type of measure is important. I don't know enough about the details to know if there is something additional that the Federal Government could be doing to facilitate marketing transfers.

Ms. DIESTER. Well, certainly conjunctive groundwater use has been happening, particularly in the Central Valley. Metropolitan, for example, has contracts to store water outside of its boundaries, and it is really more of a water quality exchange program. But you are right—the whole notion of water transfers does rest in part around the whole notion of who owns the water. But another large issue is looking at third party impacts, which I think is a key issue. Everybody has their own definition of what that should include, but also looking at sort of that delicate issue of cost of conveyance and how much should the entity that is conveying the water be paid in order to make that transfer happen. So these are some of the sticky issues.

Mr. FREDERICK. I might just add I brought a number of papers with me which I will leave with the committee, one of which was published this past spring with the title Water Marketing Obstacles and Opportunities, which discusses in quite a bit of detail and gives examples of what has worked, where the problems are.

Senator GRAHAM. Mr. Mink, you mentioned that the water resource institutes are based at the land-grant colleges in the various States. Is that correct?

Mr. MINK. That is correct, Mr. Chairman. For the most part, all of our institutes are at the land-grant universities and that is designated in our authorization act. There are a few exceptions, and those can be made by the Governor of a State if he wishes to move it to a different institution.

Senator GRAHAM. So are you based at the University of Idaho?
Mr. MINK. Yes I am, sir.
Senator GRAHAM. In Moscow?
Mr. MINK. Right.
Senator GRAHAM. Is there some effort to establish national or regional priorities in water research, such as exploring the technologies that might enhance water supply which would be conducted at a specific institute, but which would have multi-State application?

Mr. MINK. Yes, Mr. Chairman. The Institute Program is highly recommending regional projects. In fact, part of our reauthorization, section 104(g) requires regional collaboration and collaboration among States on regional water issues. The resources that Congress has provided the institutes are competed competitively across the Nation, but it does require a collaboration between two or more States and looking at regional water issues—addressing regional water issues as defined by the water managers of the respective States.

Senator GRAHAM. What are the principal projects that you are conducting at your institute at the University of Idaho?

Mr. MINK. We are looking at several projects, all the way from water supplies to the Boise metropolitan area, which is one of the most rapidly growing areas in the State. The forecast of having a water shortage for domestic water originally back in the 1960's forecasted that our supply would last until 2020, and we are at that stage right now, at the year 2000—about 20 years ahead of time because of increased population demands.

We are also working with agencies—Bureau of Reclamation and U.S. Geological Survey in looking at the issues of water supply not only for agriculture and power, but also for salmon habitat, the endangered species, and working with the States of Oregon and Washington on how we might be able to fulfill the needs of the State, but at the same time provide water down for fish habitat in the river systems.

We are also working with local communities, local rural communities on looking at their future water supplies, in small rural towns of less than 2,000 people, and assisting them in identifying future water supplies that they're having trouble with, both with respect to increased population—in some of our areas, two families move in and they've got a 100 percent increase in population—and also the water systems that have been degraded over time. A lot of them are very old and they are having some real problems, and the financial resources that these communities have are not able to manage those. So they cope with improving those.

So we are providing technical support to these communities so they can better figure out where they go for supplies. Some of the impacts of arsenic is an example in water supplies—with a lower level of arsenic, we are finding that many of our natural groundwater reservoirs exceed this arsenic limit. So we are working with those communities on how we can best solve that problem and provide a safe drinking water source for them. So these are some of the examples we are working with.

Senator GRAHAM. Ms. Diester, gentlemen—thank you very much. This has been a very helpful discussion. I look forward to reading

the papers that will be part of the record. Also as we move into the development of legislation, I hope that we can continue to call on your expertise in that process.

Thank you very much.

[Whereupon at 11:38 a.m., the subcommittee was adjourned, to reconvene at the call of the chair.]

[Additional statements submitted for the record follow:]

STATEMENT OF HON. BOB SMITH, U.S. SENATOR FROM THE STATE OF NEW HAMPSHIRE

As the Ranking Republican of the Environment and Public Works Committee (EPW), I support conducting this hearing which will examine an issue of great importance to the Chair, Senator Graham. Chairman Graham has long had an interest in the issue of water supply. The situation in parts of his home State, Florida, as with other parts of the country, is dire. However, the EPW Committee is charged with ensuring the Nation's waters are clean, not whether there is an ample supply of water.

According to *The Authority and Rules for the Senate Committees* for the 107th Congress, EPW has jurisdiction over water pollution and water resources. The Committee on Energy and Natural Resources has oversight over irrigation and reclamation, including water supply. The agency primarily responsible for helping communities meet their water needs is the Bureau of Reclamation which reports directly to the Energy Committee.

The Corps of Engineers, which reports to the EPW Committee was authorized in 1958 to help communities with water supply if it was part of a larger project or the facilities were already available. For instance, if the Corps owns a reservoir for flooding which is going unused, it is permitted to use it as a water supply source for the local community. However, the Corps cannot finance or oversee projects whose sole purpose is to ensure an adequate water supply. The only exceptions are those projects authorized in the biannual Water Resources Development Act (WRDA). Senator George Voinovich (R-OH) and I argued to no avail against the inclusion of supply projects in WRDA 2000 because they exceed the authority of the Corps and this committee which writes the WRDA bill.

During the 106th Congress, this committee, against my recommendation, exceeded its jurisdiction and that of the Environmental Protection Agency (EPA) which the Committee oversees. Congress included Senator Graham's legislation to authorize EPA to administer an alternative water source pilot project. One of my primary concerns about having passed this proposal is that we are blurring the missions of the Federal agencies to the point that we will soon have as many as three agencies performing the same function: securing water supply. This is the very type of overlap and redundancy that Members of Congress so often criticize. Further, those three agencies will report to two Senate Committees, one of which doesn't have jurisdiction over the issue.

I understand that this is a very important issue for Senator Graham and the people of Florida. It is also a concern in New Hampshire albeit not as large a problem. I believe that to the extent that the Committee can promote programs within its jurisdiction that may have a positive impact on water supply problems, it should. For instance, when adequately funded, the revolving loan programs under both the Safe Drinking Water Act (SDWA) and the Clean Water Act provide communities with the money necessary to ensure their water supplies are clean and safe, resulting in fewer contamination-caused supply problems. Further, the Environmental Protection Agency has promoted water recycling and reuse through the Clean Water Act. Again, provisions related to recycling and reuse seek to ensure a healthy source of water but also consequently address the supply problem.

Senators Jim Jeffords and Mike Crapo and I are working closely with Chairman Graham on a proposal which will examine ways to extend the life of every dollar in the revolving loan funds. While addressing water supply needs is not a goal of this proposal, just as it is not a goal of the Clean Water Act or SDWA, if our proposal is able to meet its objectives, it may result in the easing of some supply constraints.

Again, I fully understand the extent of Senator Graham's concerns. However, those concerns must be addressed within the rules of the Senate and the jurisdictions of its Committees.

STATEMENT OF HON. MIKE PARKER, ASSISTANT SECRETARY, DEPARTMENT OF THE ARMY FOR CIVIL WORKS

INTRODUCTION

Mr. Chairman and members of the subcommittee: I am Mike Parker, the Assistant Secretary of the Army for Civil Works. I appreciate the opportunity to speak to you today on the Army Corps of Engineers activities to address the water supply issues of the Nation.

In your call for this hearing, you asked that we respond to three specific questions, and I will respond to your questions in order. First, you asked that we present our perspective on water supply in the United States today including the extent to which there is or is not a water supply problem today or in our future, a description of that problem if we believe one exists, including regional differences, and a discussion of the potential cause of this problem.

We believe the Nation faces many challenges in assuring an adequate water supply. These challenges now affect all regions of the country, not just the traditionally dry areas. The availability of reliable and clean supplies of water is crucial to the health of our citizens and to maintaining the Nation's economic prosperity both now and in the future. In a series of listening sessions the Corps held last year, citizens around the Nation voiced their concerns about various aspects of water supply at every session.

At these listening sessions, the public called for better data to understand the scope and nature of the water supply problems we face. The last comprehensive assessment of the Nation's water needs was completed over 15 years ago. The public also told us that water supply is more than a local problem. Municipal leaders told us that supporting growth in an environmentally sustainable manner will require regional solutions. Consequently, new water supply projects that are feasible and efficient must often be located outside the limits of the municipalities that seek additional supplies. Technical leadership will be essential to integrate competing values across multiple political jurisdictions to reach consensus for regional water supply solutions. As an example, in landmark 1997 legislation, the State of Texas recognized these new realties and designated 16 regions to lead the development of future water supply. Larger communities within these regions were designated to take the lead for their regions.

Your second question asks us to address the extent that the Federal programs under our jurisdiction work to ensure that State and local governments are meeting water supply needs. It has been long-standing policy that municipal and industrial water supply projects are considered the primary responsibility of non-Federal parties. The authorities under which the Corps of Engineers provides water supply storage are generally project specific and a secondary purpose for the development of a project. We can provide water supply storage at completed projects by reallocating storage for other purposes and evaluate the potential for new water supply as part of planning multipurpose projects. At the present time, the Army operates 117 reservoirs containing about 9.5 million acre-feet of storage authorized and available for municipal and industrial water supply use. We also maintain approximately 57 million acre-feet of storage for agricultural irrigation in 50 reservoirs. Overall, we have over 400 reservoirs that could be modified or have existing storage that may be available for reallocation to provide additional municipal and industrial water supply storage.

I want to emphasize that Corps involvement in water supply is founded on deference to State water rights. During the enactment of the Flood Control Act of 1944, Congress made clear that we do not own the water stored in our projects. Our practice is to contract with non-Federal interests for water storage in our projects. Our policy is to continue our commitment to consistency with State water law.

The Corps of Engineers is currently working with other Federal agencies and with State and local interests to help solve several large complex regional water problems. For example, as part of the Comprehensive Everglades Restoration Plan, the Corps of Engineers is undertaking a technical evaluation of complex systems and balancing competing demands for available water resources in the development of a comprehensive regional solution. This effort integrates diverse needs, objectives and ongoing complementary efforts of multiple Federal, State, local and other interest groups. Although the Federal interest is primarily environmental restoration, this interest is closely linked, in the case of the Everglades, with water quality improvement, water supply and flood damage reduction. Another example is the comprehensive assessment of the demands and water resources available in the Apalachicola-Chattahoochee-Flint and Alabama-Coosa-Tallapoosa River systems to assist the affected States in reaching decisions on allocation of available water. These

efforts included the development of alternative scenarios and options on which allocation decisions can be based.

Your final question asks us to review what actions, if any, Congress should take to facilitate an efficient and effective Federal role in water supply. Participants in our listening sessions told us that they look to cooperative efforts between the Federal Government and States in developing integrated, regional management of water resources including water supply. Our management of water must be based on economic and environmental benefits and costs. Decisions must be science-based choices among a full array of alternative uses to which our watersheds and river basins may be put. In doing this we must respect the primacy of State water law. Congress should work with the Administration to ensure that our Nation has the framework to provide integrated water management. This framework should include the appropriate roles of the Federal and non-Federal levels of government and the very powerful part that the private sector must play in any solution to our water resources challenges.

CONCLUSION

In conclusion I believe we are facing emerging water supply challenges. Consistent with the goals of the President, the Army Corps of Engineers stands ready to work with its sister agencies in contributing to the dialog. We will continue our stewardship of our existing projects to manage water storage for efficient uses including water supply and maintain our commitment to consistency with State water rights.

Mr. Chairman, this concludes my statement, and I would be pleased to address any questions that you or the committee may have.

STATEMENT OF JOHN W. KEYS, COMMISSIONER, U.S. BUREAU OF RECLAMATION

My name is John Keys. I am Commissioner of the Bureau of Reclamation (Reclamation). I appreciate the opportunity to be here today to discuss Reclamation's role and challenges in ensuring the adequacy of water supplies in the areas we serve.

Before I discuss these issues, I would like to give the Committee some background on the Bureau of Reclamation—a water resources management agency within the Department of the Interior whose mission is to provide water and power in the 17 Western States[1]. I would also like to include a short overview of the facilities which Reclamation has developed and the benefits which they yield.

BACKGROUND

On June 17, 1902—almost one hundred years ago—President Theodore Roosevelt signed the Reclamation Act to develop and construct irrigation water delivery projects in the Western United States. The President's objective, and that of the Congress, in supporting this legislation was to stimulate agricultural development through irrigated agriculture in order to create economic opportunities in the arid lands in the West and thereby facilitate the settlement of the Western United States.

Partially because of the success of this program, the 1930's saw an exponential growth in population in the west which meant that electricity and other types of water supply, in addition to irrigation development, were needed to meet increased demands. In response, Congress authorized numerous multi-purpose projects—thereby expanding Reclamation's focus from the construction of single purpose irrigation projects to the construction of facilities to provide hydroelectric power, municipal and industrial water supply, recreation, flood control and other benefits.

BUREAU OF RECLAMATION'S ROLE IN MEETING THE WEST'S WATER SUPPLY NEEDS

As a result of its activities to meet the contemporary—and changing—water needs of the 17 Western States, Reclamation has become the largest water resources management agency in the west. Three of Reclamation's projects—Grand Coulee, Hoover and Shasta dams—are listed on the National Critical Infrastructure list. Reclamation administers or operates 348 reservoirs with a total storage capacity of 245 million acre-feet, 58 hydroelectric powerplants with an installed capacity of 14,744

[1] This includes 17 States located west of the 100th meridian. These are: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington and Wyoming.

megawatts, and more than 300 recreationsites in the 17 Western States. These facilities enable Reclamation to meet important needs and provide numerous benefits:

• We provide one out of five western farmers with irrigation water for 10 million acres of farmland that produce 60 percent of the Nation's vegetables and 25 percent of its fruit and nuts.

• We deliver water to more than 31 million people in the west, the most rapidly urbanizing region of the country.

• Our powerplants generate an average of more than 42 billion kilowatt hours of energy each year, making Reclamation the Nation's second largest producer of hydroelectric power and the 11th largest generating utility in the United States. Reclamation produces enough electricity to serve 14 million people. Reclamation's Central Valley Project in California generated more than 6.5 billion kilowatt hours of energy in 1999 and serves approximately 2 million Californians. Because of the flexibility of Reclamation's hydropower system which can provide power at the peak times of day, its value to the West is significantly greater than the mere kilowatts generated. That value was clearly demonstrated last summer during California's electricity crisis. On numerous occasions, it was Reclamation's power that kept the lights on in California. And it was Reclamation's hydropower system that ensured the integrity and stability of the western power grid—when it was overloaded and on the verge of failing.

• Our projects support habitat with water for wildlife refuges, migratory waterfowl, anadromous and resident fish, and endangered and threatened species.

• Our reservoirs accommodate 90 million visits a year at more than 300 recreationsites.

• Reclamation's Indian and other rural water projects including the Mni Wiconi, Mid Dakota, Garrison, and Fort Peck projects, when completed, will provide water to thousands of rural communities who currently do not have access to potable water supplies.

Additionally, Reclamation is helping to meet future water supply demand through broad programs promoting more efficient water use.

Water Conservation. Through our Water Conservation Field Services Program, we provide water districts with technical and financial assistance to develop effective water conservation plans. While Reclamation has a role to play in water conservation, there also are opportunities for State and local entities to offer incentives through rate restructuring, low interest loans for farmers to install more efficient irrigation facilities, and rebates for installation of efficient appliances, landscaping retrofits, and toilets.

Water Reuse. Recycled water is used for a variety of purposes, including agricultural and landscape irrigation, groundwater recharge, and industrial cooling. Reclamation's water reuse program assists western cites in enhancing their water supplies by providing funds for the 25 projects authorized under Title XVI of Public Law 102–575, as amended. Since 1992, the Congress has authorized water reuse projects in the States of California, Nevada, Utah, New Mexico, Texas, Arizona, and Oregon. NonFederal cost sharing partners pay at least 50 percent of the feasibility study costs and 75 percent of the construction costs. Total Federal costs for the 25 authorized projects is estimated at $600 million. To date, approximately $205 million has been made available in Federal assistance.

These projects are in various stages of planning, design and construction but all are estimated to be completed by 2012. Upon completion, they are expected to yield an additional 494,000 acre-feet water for beneficial use.

Facilitating Voluntary Water Transfers. Approximately 85 to 90 percent of the water consumed in the West is devoted to irrigated agriculture. In the face of rapid urbanization, the changing economics of farming, and the need to strike a balance with the appropriate protection of environmental values, voluntary transfers of water from willing agricultural sellers to willing buyers is one means by which the future water needs of the West will be addressed.

CURRENT CONDITIONS

In many regions of the Western United States, particularly in the Pacific Northwest, the 2001 water year was very dry. This severe drought meant that there was below normal water inflow to some Reclamation facilities which required unprecedented steps to balance water deliveries, power production and environmental requirements to satisfy, to the greatest extent possible, multiple project purposes. While it is difficult to predict with precision future water availability, in many of the basins that were severely affected by drought this past year, like the Klamath Basin in Oregon and California, as well as other areas that were not impacted, Reclamation is working closely with the States, local governments, watershed councils

and other interested stakeholders to identify alternative sources of water and to improve drought contingency planning.

MEETING FUTURE NEEDS

Over the past 25 years, the population of the 17 Western States served by Reclamation has increased by 32 percent compared to a growth rate of only 19 percent for the rest of the United States—making the West the fastest growing area in the Nation. Nearly every major river system in the West—the Colorado, Columbia, Rio Grande and Missouri—is heavily developed and over appropriated. That trend is projected to continue. This create significant challenges to both Reclamation and other Federal, State and local water agencies.

In addressing these challenges, it is important to emphasize the primary responsibility of local water users in developing and financing water projects. Reclamation has an important role to play, both in maintaining its significant investment in water infrastructure, and in using its expertise to help local communities meet their water needs. Also, as water demands intensify, it will become increasingly important to encourage efficient water management practices.

New Facilities to Meet Agriculture to M&I Conversion. As one of the fastest growing regions of the United States, water that was once used for irrigation will increasingly be converted to M&I usage. Because of the change in the location of usage, because of the changes in timing of when the water is needed, and because of the need for treatment of M&I water to make it potable, there is insufficient infrastructure to meet those needs.

New Projects to Meet Growth. In addition to converting the use of water from agricultural to M&I purposes, new water supply will be needed to meet the growth of certain regions of the Western United States.

Aging Infrastructure. Having dependable supplies of water and power also requires that the infrastructure which Reclamation has developed over the past century be properly maintained and upgraded where needed. Many facilities built by the Bureau of Reclamation—both for irrigation and municipal and industrial (M&I) water delivery—were built prior to the development of current engineering standards. Approximately 50 percent of Reclamation's dams were built prior to 1950. An appropriate level of annual maintenance of existing facilities is needed for beneficiaries to continue to deliver and receive the project water supplies they need in order to meet rising demands in the future, and to ensure that the benefits of Reclamation's projects can continue to be realized.

As with our dams and water delivery systems, Reclamation must also maintain its powerplants. Sustained maintenance, replacement and modernization of equipment and machinery over time, are critical to the reliability of our hydro power system.

Security. Given the importance of Reclamation's facilities for providing water and power and for protecting the public safety of downstream communities across the west, we have always placed a high priority on maintaining the safety and security of our facilities. However, in light of the tragic events that began on September 11, Reclamation has placed its facilities at a heightened state of security. While we are working closely with State and local law enforcement officials to supplement and complement our coverage, these agencies are facing constraints with their budgets and manpower capabilities.

We appreciate the recent enactment of H.R. 2925 by Congress which authorizes the Secretary of the Interior to assign law enforcement personnel from Interior, and other Federal, State, local and Tribal agencies to enforce Federal law at Reclamationsites and on Reclamation-administered lands.

CONCLUSION

As you can see, Mr. Chairman, the Bureau of Reclamation has a diverse and important mission in working to help the arid west to meet its water and power supply needs—especially as this region continues to be the fastest growing in the Nation.

We look forward to working with the subcommittee and with all water users and the interested public to develop ways to meet competing water needs and demands into our second hundred years of service to the west and to the United States. Thank you for the opportunity to participate in today's hearing.

I would be pleased to answer any questions.

RESPONSES BY COMMISSIONER JOHN W. KEYS III TO ADDITIONAL QUESTIONS FROM SENATOR GRAHAM

Question 1. An issue associated with national water supply is the need to ensure and increase where necessary, the security of the Nation's water systems. How does the Bureau of Reclamation (BOR) envision covering costs for any additional security at BOR dams and distribution facilities? How will the security needs of BOR facilities, where operation and maintenance have been transferred to irrigators, be accomplished and funded?

Response. Mr. Chairman, this is an incredibly important issue that Reclamation has been working to address. On April 4, 2002, I signed a policy to address the issue of how increased security costs are handled and in particular, how to expend the $30.3 million fiscal year 2002 Emergency Appropriations for emergency expenses to respond to the September 11 terrorist attack, which are being used for counter terrorism protection measures on Reclamation owned lands and facilities. I have enclosed a copy of that policy for the record.

Question 2. If the Federal Government were to increase its role in water supply services to the remaining 33 States, the Burreau would surely be required to help, if not lead this effort. Are you aware of problems on the east coast involving supply that you have not had to address with Western States?

Response. When the Bureau of Reclamation was established 100 years ago this year, the Reclamation Act of 1902 authorized the agency to design and construct irrigation projects exclusively in the Western United States. While our authorities have been expanded over the past 100 years to address municipal and industrial supply, hydroelectric power generation, recreation, fish and wildlife mitigation and enhancement, flood control, drought preparation and planning, and waste water recycling and reuse, we have continued to be limited in express authority to the 17 Western States. As such, we have dedicated limited attention to the water resource management issues associated with the eastern portion of the United States.

While we have not closely evaluated the Eastern United States, in general I would expect that the water-related issues in the Eastern United States, mainly associated with quantity and quality, are very similar to those that we deal with in the west. The differences are most likely related to the relative degree of importance of each aspect of these issues. For example, the issue of water quality for human consumption purposes, while becoming an increasingly important issue we are dealing within the west, has historically been a relatively small part of our program. In the east, however, due to historically greater population density, water quality has been a significant issue for a long time. A significant issue is the conjunctive use of surface and groundwater supply demands, however there is a general lack of recognition of this inter-connectedness of surface water and groundwater in most States' water laws, which becomes a barrier to success in managing water in the East. In addition, one of the primary missions for Reclamation has, historically, been to build projects to deliver water for agricultural irrigation. In the east, irrigated agriculture is much less widespread.

While Reclamation operates in the and West, drought issues in the East could have a significant impact to many citizens. In dealing with drought in the West, Reclamation has developed considerable resources and experience that could be of benefit to Eastern communities in times of water supply shortage.

One significant difference in water supply issues would be related to the nature of the different legal systems for water allocation in the East as compared to the West. In the West, water law is based upon the prior appropriations doctrine—whereby water rights are based upon the first in time, first in right principle. This means that anyone who puts water to use has priority over others who began to use water on a later date. Water rights under this principle depend upon actual usage, rather than land ownership, as a property right interest to the right to use water.

In the Eastern States, water is allocated based upon the riparian doctrine whose fundamental principle is that the owners of land bordering a waterbody acquire certain rights to the use of water. According to the Deportment of Agriculture, currently every eastern and Midwestern State that uses the riparian water rights doctrine, except South Carolina, has modified its laws to require water appropriations to secure a permit to divert water out of a water body. The net effect is very much similar to western prior appropriation doctrine in allowing depletion of the stream flows in a regulated manner by owners of non-riparian lands.

Reclamation has significant technical capabilities that we have provided to other Federal agencies, such as the Federal Emergency Management Agency, involved in water issues in the East. While the majority of Reclamation's experience has been with Western States and, as such, we have not conducted any in-depth technical

analysis of the water supply issues in the East, we believe there are many similarities in water supply issues between the West and the East that Reclamation has considerable experience and knowledge in dealing with over the course of the past 100 years.

Question 3. What kind of budget and staff increases would the Bureau need if it were to expand coverage to the entire United States?

Response. Since Reclamation operates almost exclusively in the 17 Western States—we have not evaluated the water supply issues and needs of the east. Further, without a firm grasp of the issues to be addressed in this region, we do not have the data to put together even ballpark estimates for the budgetary or staffing needs to address the water supply issues associated with the East.

STATEMENT OF ROBERT M. HIRSCH, ASSOCIATE DIRECTOR FOR WATER, U.S. GEOLOGICAL SURVEY, DEPARTMENT OF INTERIOR

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to report on the status of water conditions in the United States as monitored by the U.S. Geological Survey (USGS).

The USGS is a science agency within the Department of the Interior with a history of 122 years of providing scientific information needed for the wise management of our Nation's natural resources. The study of water goes back to our very early years and the work of our second Director, John Wesley Powell, who focused much attention on the availability of water resources for the economic development of the West. The USGS of today consists of four major program areas: Geology, Geography, Biology, and Water. The USGS strives to combine these four disciplinary areas to provide more complete information and analysis regarding the resource and environmental issues facing our Nation.

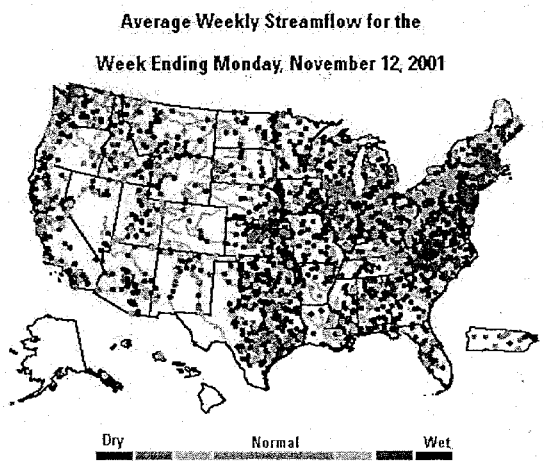
Hydrologically, conditions across the country are quite varied at the present time. The West is a mixture of above-normal flows in southern and coastal California, normal flows in Washington State, and below-normal flows in the northern and central Rockies, northern California and Oregon. Although the interagency U.S. Drought Monitor, which incorporates USGS streamflow information, continues to depict much of the Northwest as being in moderate to extreme drought, streamflows have moderated in some areas (such as Washington State) during the past 4 to 6 weeks. In the central third of the Nation, rivers and streams are generally flowing in the normal range, with above normal flows throughout Indiana, southern Michigan, and eastern North Dakota. Indeed, intense and persistent rains in October brought very high flows and flooding to much of the southern Great Lakes and northern Ohio Valley from the middle of October to early November The East, however, is a different story. Streams in the coastal States from Maine to Florida are reporting very low flows for this time of year, with many setting new daily and weekly records.

The USGS water resources program provides reliable, impartial, timely information that is needed to understand the Nation's water resources.

We operate about 7,000 streamgages, which monitor the flow of water in our Nation's rivers and streams, and we freely provide the current and historical data to a wide range of users. This information is used for purposes that include: water supply planning, flood risk assessment, water quality management (including calculation of Total Maximum Daily Loads under the Environmental Protection Agency's Clean Water Act Program), water supply operations, streamflow forecasting (done primarily by the National Weather Service, the Army Corps of Engineers, and the Natural Resources Conservation Set?vice), habitat assessments, and personal planning of river-based recreational activities. Currently, we are in a process of modernizing the streamgage network. At the present time, about 5,000 of these stations have satellite telemetry that enables us to provide near-real-time data to all users via the Internet.

Using these data, and information from other agencies, I will describe the current surface-water situation across the Nation, as well as variations and changes that have occurred in recent weeks. To (to this I will rely on an illustration that we create daily and place on the USGS website. It is based on conditions for the preceding week at all USGS streamgaging stations that have 30 or more years of record and have telemetry systems. Each dot on the map represents an individual gage. They are color coded with red indicating that flows for the week were the lowest ever recorded for that time of year, brown indicating that flow was below the 10th percentile, orange was between the 10th and 25th percentile, green indicates "normal" (25th to 75th percentile), light blue is 75th to 90th percentile, dark blue is above the 90th percentile, and black represents record high flows for this time of year.

Figure 1. AVERAGE STREAMFLOW FOR THE WEEK ENDING NOVEMBER 12.



The lowest flows currently are occurring in southern Virginia and western North Carolina. During the past several weeks, more than 3 dozen streamgages have reported new record daily and weekly low-flows in this area. This pattern is also reflected in groundwater declines as monitored at a few USGS wells that report in realtime in this region. Other areas experiencing record low flows for this time of year include South Carolina, the Delaware River basin, and parts of New England.

What's interesting about the pattern of dryness in the East is that, although it seems to have just recently appeared, it has actually been lurking around since early summer. Along the entire Eastern Seaboard, except for South Florida, flows have been varying between normal and below normal since July. There were no persistent rainy periods, particularly those associated with tropical storm systems, to produce and maintain elevated flows and, when below-normal to much below-normal precipitation occurred throughout the coastal States during October, the region was poised to experience fairly rapid streamflow declines. Although the reservoirs serving some metropolitan areas are at normal to above-normal levels for this time of year, such as those feeding the Potomac River upstream of Washington, DC, other systems are already showing signs of stress. Just last week, for example, storage in the Upper Delaware River Basin reservoirs declined to drought warning levels, triggering reductions in Delaware River flow targets and water diversions to New York City and New Jersey.

I would like to focus for a moment on the Delaware River Basin, which encompasses more than 13,000 square miles in Delaware, New Jersey, New York, and Pennsylvania. As major river systems go, the Delaware River Basin is a small watershed—covering only about 0.4 percent of the U.S. land area. Despite its small size, the Basin provides water to about 20 million people, about 7 percent of the U.S. population. Although not physically in the basin, New York City obtains about one-half its water supply from three reservoirs in the Upper Delaware Basin. As I mentioned previously, water supplies in the Delaware River Basin are showing signs of stress. On November 1, 2001, combined storage in the Upper Delaware Basin reservoirs was 98 billion gallons, or 36 percent of capacity, and continues to decline. This is 57 percent lower than the level of storage that existed a year ago. As a result of these abnormally dry conditions, New Jersey, New York, and Pennsylvania have recently declared some level of drought alert for counties in the basin. Voluntary conservation measures are being requested in these areas. If storage continues to decline at the present rate, the Delaware River Basin could be in a drought emergency condition by early December, resulting in the imposition of mandatory in-basin conservation measures and restrictions.

The precipitation Outlook for November to January, issued recently by NOAA, indicates normal conditions across most of the United States. The Southern Plains may receive above-normal rainfall, and parts of the Southeast below-normal rainfall. If such conditions were to occur, the water resources situation in South Carolina, Georgia, and northern Florida could only get worse. However, it is worth noting that

we are now entering the time of the year when water demand goes down. Evaporation is reduced, and people will not be watering lawns, washing cars, or irrigating crops as during the summer months. So declines in streams and aquifers will be less noticeable to the average citizen now than in the late spring or summer. Still, normal rainfall would not be sufficient to restore deficient stream-and aquifer-levels to normal. It would take above normal precipitation over a period of weeks to months to do that. Thus, given current hydrologic conditions, the East Coast will need to average above-normal precipitation over the coming 4 to 5 months to ensure that normal water supplies are available next spring and summer; particularly in those areas already experiencing shortages.

The streamgaging network, that measures the "pulse" of the Nation's rivers (and enables LIS to produce a "snapshot" of conditions such as I have used here), is a priority for the USGS. We have worked closely with the Congress over the last 3 years and thanks to your Support, and the support of hundreds of State, local, and tribal agencies, we have made good progress in modernizing and stabilizing the network. We are working with our partners in ail effort to assure that these vital data continue to be available to water resource management.

I should also briefly mention the importance of groundwater as an indicator of drought and as ail important aspect of the mechanisms available to communities, agriculture, and industry as insurance against drought. While our ground-water level monitoring networks have not been modernized to a level where we can provide the same kind of synoptic view of ground-water conditions as we presented for surface water, we anticipate improvements in the next few years. We believe that the science of groundwater hydrology is crucial to water management not only in and regions, but nationwide. Conjunctive use of surface and groundwater has great potential for making water supplies more drought resistant. Groundwater is crucial to sustaining streamflow for habitat and for water Supply. More and more we find that our partners are interested in the role that groundwater plays in maintaining adequate flow and temperature conditions in rivers.

We also find that emerging technologies such as artificial recharge, aquifer storage and recovery, and recharge of reclaimed wastewater are pivotal parts of the water management equation. The Science to support the use of these new technologies is a part of our strategic plan for the future of USGS ground-water science.

I thank the Subcommittee for this opportunity to testify and would be pleased to respond to any questions you might have.

STATEMENT OF THOMAS A. WEBER, DEPUTY CHIEF FOR PROGRAMS, NATURAL RESOURCES CONSERVATION SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. Chairman, and Members of the subcommittee, thank you for the opportunity to appear today and present views on behalf of the United States Department of Agriculture, regarding water supply issues in our Nation. I am Tom Weber, Deputy Chief for Programs at the Department's Natural Resources Conservation Service (NRCS). The mission of NRCS is to provide leadership in a partnership effort to help people conserve, improve, and sustain our natural resources and environment. Our agency was created in response to the Dust Bowl days of the 1930's, helping farmers and ranchers manage and conserve water resources has remained among our principal activities.

As most Members on this Committee are already aware, America's farmers are among the most productive in the world. They feed our population with the highest quality, safest, and most affordable food anywhere, while producing food for others all around the world. Today, farmers face new challenges, many associated with the use of natural resources. These include the soil health, air quality, and wildlife habitat issues. But around the country, farmers and ranchers face ever increasing concern for the quantity and quality of water.

Persistent shortages of water and prolonged abnormal moisture deficiencies adversely and permanently affect vegetation, animals, and people. Recently, Secretary of Agriculture, Ann Veneman released, Food and Agriculture Policy: Taking Stock for the New Century. This document is our long-term view of the Nation's agriculture and food system, with emphasis on the conservation of natural resources. We propose that our policies not only buildupon past gains in resource conservation, but also must prepare us to respond to emerging challenges such as the inextricable link between water supply and agriculture. Without question, the future of our farms and water supplies are interdependent and are exemplified by the following facts:

- nationwide, agriculture accounts for nearly 80 percent of all water consumption.
- Three-quarters of all cropland in the Western United States is irrigated.

• The 16 percent of harvested cropland that is irrigated accounts for nearly half of the value of all crops sold.
• nationwide, nearly 100 percent of all orchard sales and more than 80 percent of the sales of vegetables and potatoes are produced on irrigated cropland.

Throughout the country, demand for water is increasing, with added pressures from municipal use and urbanization. I would add that prior to coming to Washington, DC. I served with NRCS in California and also as State Conservationist in New Mexico. From my work in these States, I can attest that the experiences of the West on water supply issues may be a foreshadow of emerging conflicts in other regions of the country.

While we are not being able to control the precipitation, we do believe that agriculture is uniquely positioned to be part of the solution to water issues. From its inception, NRCS has helped farmers and ranchers with on-farm water management. Following are a few examples of ways we can help:

CONSERVATION TECHNICAL ASSISTANCE

We believe that the best approach is to begin with a proactive conservation plan and then implement it. NRCS field conservationists provide technical assistance to farmers and ranchers to develop voluntary resource conservation plans. Conservation technical assistance does not regulate or compel farmers to accept practices, but instead encourages them by demonstrating the benefits of conservation. In addition, NRCS field staff identify opportunities for other forms of USDA incentives-based conservation assistance, including cost-share, conservation easements, and other opportunities.

TECHNOLOGY AND RESOURCE ASSESSMENT

NRCS also offers valuable resource information that assists with resource planning such as; *Snow Survey and Water Supply Forecasts*—The purpose of this program is to provide Western States and Alaska with information on the seasonal availability of water from melting snowpacks. NRCS field staff and partners collect data on depth and water equivalent of the snowpack at more than 1,200 manually read mountain sites. The automated snow telemetry (SNOTEL) provides daily and hourly data from additional 650 locations. The NRCS Water and Climate Center provides weekly and monthly predictions of the resultant stream flows via web services. These forecasts are used by individuals, Tribes, organizations, and State and Federal agencies to make decisions relating to agricultural production, fish and wildlife management, municipal and industrial water supply, urban development, flood control, recreation, power generation, and water quality management.

The National Cooperative Soil Survey is a partnership effort to inventory the Nation's soil resources. The survey produces comprehensive soil maps, descriptions and interpretations. Land users employ this data to make resource decisions on their farms and ranches based upon water availability. Soils, especially high quality soils, resist degradation from drought and flooding, to quickly recover to agricultural productivity. We also conduct the National Resources Inventory. Through this effort, NRCS gauges the condition of natural resources at 800,000 sampling sites, and is able to provide analysis of the resource trends and impacts.

The *Conservation Plant Materials Program* identifies and distributes millions of native plants to address natural resource problems. As part of this effort, NRCS evaluates the drought-tolerance of plants, and works to develop new vegetation that can assist farmers and ranchers who face water supply shortages.

PROGRAM ASSISTANCE

NRCS also offers an array of opportunities to farmers and ranchers facing water-related concerns. Included in these, are the following programs:

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

This program provides technical, educational, and financial assistance to farmers and ranchers in high-priority regions for protecting soil, water, and related natural resources. Water conservation is one of the resource concerns brought forth from the locally led process that sets priorities for this assistance.

WETLAND RESERVE PROGRAM

This program provides long-term drought prevention by protecting the swamps and marshes that conserve water and water-loving plants and animals. Landowners establish 30-year or permanent conservation easements or sign restoration cost-

share agreements. Wetland restoration provides many water conservation benefits such as to augment low stream flows and provide water critical to wildlife.

WATERSHEDS AND FLOOD PREVENTION OPERATIONS PROGRAM
(SMALL WATERSHED PROGRAM)

The Watersheds program engages State and other public agencies (called project sponsors) in water and land treatment projects. These partners enhance flood control, watershed management, water conservation, municipal and industrial water supply, recreation, and fish and wildlife protection. Since 1944, conservation partners have built more than 10,000 flood prevention structures across the country. Many of these structures have provided communities with additional water supplies crucial during droughts.

EMERGENCY WATERSHED PROTECTION PROGRAM

This program is targeted to communities—as opposed to individuals—by relieving imminent hazards to life and property caused by floods, fires, windstorms, droughts and other natural occurrences. The Emergency Watershed Protection program is a recovery program. Other programs solve problems that predated the disasters or prevent future disasters. The Natural Resources Conservation Service provides technical assistance and pays as much as 75 percent of the costs for emergency repairs, such as removing debris from a stream. We also purchase easements from willing landowners on flood prone areas to prevent future crop losses.

There are many challenges facing America's farmers and ranchers on water quality and quantity issues. We believe that incentives and technical support for improved on-farm water management, and sound resource data and assessment, can make a real difference. In 1998, Congress enacted the National Drought Policy Act. The law established an advisory commission to provide advice and recommendations on the creation of an integrated coordinated Federal policy designed to prepare for and respond to serious drought emergencies. The 15-member commission consisted of farmers, ranchers, and government officials from around the country and was chaired by the Secretary of Agriculture. The commission presented a report to Congress in May 2000 entitled, "Drought in the 21st Century".

The Commission made several recommendations regarding NRCS including support for technical assistance and funding for voluntary programs such as the Environmental Quality Incentives Program. The Commission also recommended expansion of resource inventory and technology capacity of NRCS as well as encouraging accelerated work with tribes, States, counties, and towns to develop and maintain drought preparedness plans.

Congress is currently working toward reshaping agriculture policy for the future through reauthorization of the Farm Bill. Without question, water and agriculture will continue to weigh heavily into these discussions and consideration. One of the central themes is that future policies must square with today's realities. Without question, the reality that many of our Nation's farmers and ranchers face is an increasingly scarce supplies of water, and increasing pressure and competition for the water. It is difficult enough to be productive and profitable today in agricultural production, and adequate and affordable production inputs such as water are crucial. I would conclude by reiterating that even if we are not able to control the weather, conservation programs can play an important role in helping provide local people with the tools and assistance to mitigate the effects of water shortages.

I thank the Chairman, and would be happy to respond to any questions that members of the Committee might have.

STATEMENT OF ANE D. DEISTER, CO-CHAIR, INTERIM NATIONAL DROUGHT COUNCIL, ASSOCIATE VICE PRESIDENT, METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

I serve as the non-Federal Co-Chair of the Interim National Drought Council with Secretary Ann Veneman, USDA, serving as the Federal Co-Chair. The Council was formed last year through a Memorandum of Agreement, in response to the recommendations of the National Drought Policy Commission (NDPC), on which I served as the national urban water representative. The NDPC held a number of hearings across the Nation and submitted its final report and recommendations to Congress in the summer of 2000.

Presently, I work in a senior management position with the Metropolitan Water District of Southern California, one of the largest regional water management agencies in the country. Previously, I worked for 15 years in Florida, including a top staff

position at the South Florida Water Management District. These remarks reflect a diversity of experience and perspectives including the California and Florida water resource experience, work with multi-State and national drought management entities, and participation in the American Water Works Association (AWWA), Association of California Water Agencies (ACWA) and the Interstate Council on Water Policy (ICWP).

In your invitation letter you asked that we address three things. These remarks are prepared with a short overview, followed by answers to the three questions, with further details provided in an attachment.

OVERVIEW

Lately there has been a great deal of attention dedicated to the issue of water supply security. Previously, information was presented to Congress regarding the issue of aging infrastructure. However, the basic water supply condition in the world, Nation, regions, States, tribal areas, local jurisdictions and ecosystems is challenging today, and expected to become even more challenging in the future. The basic dilemma is that fresh water resources are finite, and demands on them are increasing, often resulting in competition, conflicts, and water wars with economic, environmental, agricultural, industrial and safety impacts felt by the water consuming public.

In addition to the basic resource scarcity, the process of water supply decision-making is often equally challenging. The planning, preparedness and solutions to water supply problems are often delayed until they reach near crisis conditions, which may constrain and reduce the available approaches and options. As a result, some of the most cost-effective water supply measures such as conservation, recycling and groundwater conjunctive use may be overlooked, with more controversial supply options supported by well meaning managers, under emergency or near emergency situations.

Finally, the role of the Federal Government has been helpful in a few specific instances. But overall some changes in the Federal role could result in measurable, cost-effective benefits for the water-using public.

Question 1. Perspective on water supply problem today or in our future, a description of that problem, including regional differences, and discussion of the potential causes of this problem:

The simple answer is yes there is a water supply problem in the Nation today, and indications are that these problems will become more difficult and severe in the near term. For many years in two diverse States—California and Florida—at opposite ends of the country, there has been a common phrase among water managers. That is, there is sufficient supply, but not in the right locations, at the right time or amounts to meet demands on a sustainable basis. At some point in the past 10 years California, Florida, Texas, Georgia, Washington, Idaho, Washington, DC, Maryland, Virginia and most of the other Western States have declared or come close to declaring drought conditions in their States. In many cases these declarations have covered consecutive years. With this increase in frequency of multiple year drought conditions, water managers today may be rethinking that old saying.

The World Water Commission for the past couple years has been reporting on the global water supply picture, including:

- Only 2.5 percent of the world's water is freshwater
- Of that, ⅔ is trapped in icecaps and glaciers
- Of the remaining ⅓, 20 percent is in remote areas
- Of the remaining amount, 80 percent comes at the wrong times or in the wrong locations to meet the need
- Seventy percent of the world's water is used for agricultural purposes
- Increases over the next 2 decades are predicted:
  - Human use by 40 percent
  - Agricultural use by 17 percent
- As a result, aquatic ecosystems will be affected

The attachment includes several pages of specific water supply problems, organized by State, with problems noted in almost every State. The source of the problems, the nature of the impacts vary geographically and hydrologically, but overall the factors contributing to the current and growing water supply challenges include:

- natural water resource limits;
- changing climate conditions and uncertainties;
- ever-increasing water quality constraints and associated treatment impacts;
- growing demands and competition for resource supplies and uncertainties regarding population growth predictions;

• the need for regional integrated resource plans throughout the country, incorporating a diversity of supplies including both structural and non-structural water supply solutions;
• the need for coordinated Federal water resource management policies, approaches and priorities;
• the need for coordinated, technical data collection, analysis, and integration including monitoring and prediction, water use estimates, advancements and applications for recycling and conservation;
• the need for official, coordinated Federal conflict resolution practices;
• the need for a shift in Federal funding priorities from response to readiness, emphasizing planning and preparedness activities.

Each of these factors is discussed below.

NATURAL WATER RESOURCE LIMITS

As previously noted, in the attachment, several pages list key water supply problems, constraints or challenges for almost every State. The Committee asked for regional differences to be shared in the testimony, and while there are differences such as groundwater versus surface supplies, the similarities are vivid and real. Virtually every State in the country is presently or on the verge of facing water resource supplies challenges or shortages. In some cases, such as in Southern California, the predicted reductions in supplies from the Colorado River, potential supply challenges associated with the State Water Project, and natural rainfall circumstances have led Metropolitan Water District to invest in a number of programs and water producing projects over the past 10 years. They include emergency surface storage (Diamond Valley Lake), development of groundwater storage and conjunctive use programs within and outside district service areas, and accelerated and enhanced recycling and conservation investments, all on a cost competitive basis. Yet, that is not the routine across the country, even though the challenges in each State mimic in their own way the challenges being faced by Southern California.

Additionally, the term 'drought', once defined by meteorological conditions, over the past few years has been extended and expanded to generally reflect any water shortage, or water curtailment circumstance. Water managers are using terms such as 'regulatory drought' and 'water-quality-driven drought' across the country today. The recent experiences in the Klamath Basin and earlier water supply curtailments of the State Water Project in California have been characterized by some as 'regulatory droughts'. The growing problem of increasing salinity in water supplies resulting from a variety of sources and practices is an example of how changes in water quality may effectively reduce the amount of water to meet demands, hence the term 'water-quality-driven drought'. The term drought management, then, has become one of comprehensive water resources management, and must consider environmental needs for water, as well as economic, agricultural, social, industrial and other human impacts associated with water supply shortages. After more than 5 years of reviewing the drought management needs across the country, and comparing those needs with Federal, State, tribal and local assistance and programs, we have identified significant service and assistance gaps that need to be filled to help the country deal effectively with this growing resource challenge.

CLIMATE UNCERTAINTIES

There is general agreement among scientists that CO_2 is increasing in the atmosphere and the majority of the scientific community believes that the climate has changed and will continue to change. There continues to be uncertainty regarding the degree of climate variability, the regional effects and potential impacts.

However, despite the continued dialog regarding the degree and extent of climate change, there are some important projections that contribute to water supply challenges. They include:
• Shifts in precipitation type from snow pack to rain fall;
• Shifts in precipitation locations from north to south;
• Shifts in precipitation frequency and duration, evidenced by El Niño, La Niña and the Pacific Decadal Oscillation (PDO) effects;
• Shifts in precipitation amounts, and predictions of longer, multi-year droughts.

The relevance of these shifts is that water supply and distribution systems designed for previous hydrologic regimes, may not be suitable for the emerging regime. In the west, the snow pack is in effect a 'reservoir', which if reduced substantially, results in more rainfall, greater runoff and water supplies that may be out of sync with reservoirs, groundwater management basins and distribution networks currently in place. Both tree ring and remote sensing data point to extended periods of drought, throughout the country, encompassing 15–20 years of consistently dry

conditions. That same data reveals similar periods of flood conditions as well, with few years of 'normal' conditions. Again, this information suggests an overall challenge on the horizon and increased probability of water supply shortages nationwide, and most certainly in the west.

WATER QUALITY CONCERNS AND TREATMENT IMPACTS

Salt water intrusion and contamination has emerged as a major water quality problem throughout the country, which often reduces the direct uses of water supplies and impacts the ability to recycle water. Various land use practices contribute to this problem, including intensive growth in coastal areas, agriculture, and other naturally occurring conditions exacerbated by growing water demands. Additionally as detection technologies have increased, the number of contaminants regulated by the Safe Drinking Water Act have also increased, with treatment cost rising exponentially. The attachment includes a couple of charts that illustrate this dramatic increase, with a significant jump occurring between 1990 and 1998. In 1990 there were approximately 30 constituents with more than 80 in 1998. Arguments could be made on all sides of the discussion about this proliferation of water quality regulations, but nevertheless they do contribute to the challenge of meeting water supply demands.

GROWING DEMANDS/COMPETITION FOR RESOURCES

There are many classic water competition examples across the Nation, with only a very few of the current situations listed below:

- Floridan Aquifer—Alabama/Georgia/Florida
- California Bay-Delta and State Water Project
- Colorado River 7 basin States
- Texas Edwards Aquifer
- Minnesota groundwater—irrigation and domestic competition
- Delaware River Basin area on drought watch
- Ogallala groundwater basin management

This is only a snap shot to illustrate the diversity of areas experiencing competition for resources and growing demands.

EXISTING AND CHALLENGING REGIONAL INTEGRATED RESOURCE PLANS

The National Drought Policy Commission and other national organizations have identified several successful models located throughout the country where integrated resource planning is occurring on a regional basis. Yet even these successful regional integrated planning bodies could benefit from a more collaborative relationship with the Federal Government. These successful models include:

- Florida's 5 Water Management Districts
- Metropolitan Water District of Southern California
- Santa Clara Valley Water District
- Delaware River Basin Commission
- Ohio River Basin Commission
- Susquehanna River Basin Commission

Using the Metropolitan Water District as an example, the model can be based on a few key regional integrating planning strategies including:

- Invest in conservation and local resources—over past 10 years 800,000 AF conserved and recycled, projected to reach 1.6 MAF by 2020
- Reduce reliance on Bay-Delta during dry years to improve ecosystem management
- Keep the Colorado River Aqueduct full through innovative conservation, storage and water transfer programs
- Develop and implement a preferred resource mix, balancing local and imported water (IRP)
- Develop and implement a resource portfolio strategy for drought management, incorporating storage during surplus periods for use during dry periods (Water Surplus and Drought Management Plan)

In addition, there are some newly framed regional compacts and other emerging regional areas where there is a need for greater integrated resource planning, including:

- U.S. and Mexico issues with the Rio Grande and Colorado River
- ACT-ACF, Georgia, Florida, Alabama issues (Apalachicola Bay, Atlanta, etc.)
- Texas SB 1 implementation

These are not the only regional integrated planning examples, but they illustrate the types of existing regional approaches. However, there are many more situations where there has been no regional planning or coordination, resulting in existing and

imminent water supply shortages and challenges. They also represent locations where there are missed opportunities for economies of scale and the benefits of share visioning and development of mutually beneficial solutions.

NEED FOR COORDINATED FEDERAL POLICIES, APPROACHES AND PRIORITIES

The National Drought Policy Commission report, May 2000, identified more than 80 Federal programs related to Federal drought assistance. Despite a lot of investigation, analysis and evaluation we were unable to identify coordination among those programs. They are based in numerous Federal departments such as USDA, Bureau of Reclamation, Army Corps of Engineers, EPA, NOAA, SBA, and to some limited degree FEMA, which might explain some of the lack of coordination. However, we also discovered that multiple programs within the same department lacked coordination, as well.

The recent experience in the Klamath Basin is an example where an upfront coordinated approach, and collaboration with the affected water users, in hindsight, would have been beneficial. Additionally, a similar situation, thought not quite as extreme as the Klamath, occurred a year or so ago in California regarding the management of the State Water Contract supplies. Again, these are not the only examples, but serve as an indication of the need. These examples also underscore the fact that the Federal Endangered Species Act and its State counterparts have largely become the main driver in the need for coordination among a diverse set of regulatory agencies that control today's water supply decisions.

Yet there are some coordination and collaboration efforts occurring today, which warrant mentioning. One of the members of the National Drought Policy Commission and Interim National Drought Council is the US Army Corps of Engineers. They have extensive information on this topic, and have advised the commission and council members on challenges related to water supply development projects, and also on the success stories where a coordinated and collaborative approach was used. The Corps has been undergoing a transformation in the way they conduct business, and are moving more into the multiple purpose and multiple benefits arena as a result. Additionally, the Corps and the Bureau of Reclamation, in response to a recommendation made by the National Drought Policy Commission are developing an MOU to allow the Corps to perform drought management studies for the Bureau and to combine their expertise and effectiveness nationwide.

The Western Drought Coordination Council, a collaboration between Western States, several Federal agencies, urban interests and other stakeholders, initiated by the Western Governors' Association, represents a successful regional coordination and collaboration effort between Federal and nonFederal participants. The National Drought Policy Commission and Interim National Drought Council also serve as models of collaboration and cooperation between Federal and nonFederal entities.

As more and more coordination examples occur, there is increasing evidence of the cost savings, resource benefits and environmental and economic productivity rewards of coordination among Federal agencies and with States, tribes and local entities requiring assistance in water supply planning.

NEED FOR COORDINATION, COLLABORATION OF SCIENTIFIC/TECHNICAL DATA COLLECTION, ANALYSIS AND INTEGRATION

A specific successful data coordination project is the weekly production of the Drought Monitor map and report. This is a collaborative data sharing effort between USDA, NOAA, the National Drought Mitigation Center at the University of Nebraska at Lincoln, and several regional and local weather monitoring and prediction entities in both the public and private sectors. The group tracks the occurrence of drought across the country, with weekly updates reporting on current conditions and any changes since the previous report.

This coordination effort points out the multiple benefits of shared visions, and coordinated scientific pursuit. There are many areas in which adequately funded coordinated data collection, analysis, and evaluation is needed from the Federal Government. A few areas of particular need are:

- Groundwater supplies and recharge and extraction rates of aquifers
- Water use consumption, demand forecasting, and accurate estimates of water supply and demand balance
- Conservation measures in urban, agricultural, commercial, institutional and industrial sectors
- Stream gages and other watershed monitoring
- Weather prediction and long term patterns and trends

NEED FOR COORDINATED FEDERAL CONFLICT RESOLUTION PRACTICES

There has been an increasing emphasis within Federal departments and agencies to use alternative dispute resolution and conflict resolution practices, particularly in regulatory disputes. There is also a slowly growing practice of using collaborative processes with Federal and non-Federal participants sharing data, agreeing on the issues and developing solutions. The CALFED and Everglades examples have been previously noted, and many others have occurred, for example in Sarasota Bay, Tampa Bay, Lake Tahoe, Santa Monica Bay and the Chesapeake Bay. However, there is a growing need for an officially sanctioned Federal practice of alternative dispute resolution and consensus based decisionmaking for water supply problems. There is increasing information in the legal and resource management literature illustrating successes at local, regional, and multi-State levels where participatory conflict resolution approaches were used to solve problems, planned for litigation expenditures were redirected to project and program implementation, and with lasting inter-group relationships created. Yet, there is less experience within the Federal Government among various departments and agencies, and between Federal and non-Federal partners and participants.

NEED FOR SHIFT IN FEDERAL PRIORITIES FROM RESPONSE TO READINESS

One of the primary recommendations from the National Drought Policy Commission is the need for the Federal Government to shift priorities—particularly in funding decisions—from response or bailouts to readiness or planning and preparedness measures. There was also a caution to make sure that the shift occurs in such a way as to provide a reasonable transition for States, tribes and local entities to implement this change in priorities in their own areas. For example a safety net for true emergencies would need to be in place for a period of perhaps 10 years, for many agricultural programs to shift from an emergency to readiness paradigm.

The National Drought Policy Commission report also documented the substantial savings of providing up-front solutions to water supply shortages and problems, studies such as the NSF funded "Government Response to Drought in the United States: Lessons from the mid–1970's" have shown that the Federal Government spent significant amounts on responding to drought impacts, including:

- $3.3 billion responding to the 1953–1956 drought
- at least $6.5 billion during 1976–1977 drought
- about $6 billion during the 1988–1989 drought

But there are clearly other costs as reported in "Drought and Natural Resources Management in the United States: Impacts and Implications of the 1987–1989 Drought" (Riebsame, Changnon and Karl) which documented a reduction in crop production of nearly $20 billion and an increase in food prices of more than $12 billion because of the 1988 drought. The report also noted the low flows in the Mississippi River caused barge shipping prices to double and triple leading to an estimated $1 billion in increased transportation costs. At one of the National Drought Policy Commission hearings the Texas Agriculture Commissioner, Susan Combs, reported that in 1996 and 1998 droughts in her State caused a loss of $4 billion in direct income with a total impact to the State's economy close to $11 billion.

Question 2. Extent to which Federal programs are effective or ineffective in ensuring that State and local governments are meeting water supply needs.

There are some effective Federal programs, such as California's CALFED program and Florida's Everglades restoration program. Both address the problem of resource scarcity and increasing competing demands for those resources. They both have used collaborative processes to help minimize conflicts, with a goal of environmental restoration and protection. But even with these successful models there have been occurrences when tough decisions had to be made regarding such options such as storage and conservation for water supplies.

At the other end of the spectrum is the general issue of Federal agencies, with specific mandates and perspectives, and little incentive to cooperate, collaborate and develop a shared, mutually beneficial approach to water supply. This is partly due to the more than 80 governmental programs in a dozen Federal entities, involved in water resource and drought related assistance programs. Yet there is no Federal forum for integrating the concerns, perspectives and mandates of various Federal departments and agencies, which also includes effective mechanisms for Federal and non-Federal participants to work collaboratively. Several parts of the discussion above provide further specifics on this question. Taken collectively several of them relate to the need to re-evaluate the ability of any single agency to veto coordinated plans to meet water supply needs. They are noted under the headings:

- Need for coordinated Federal policies, approaches and priorities

- Need for coordinated, collaborative scientific/technical data collection, analysis and integration
- Need for coordinated Federal conflict resolution practice
- Need for shift in Federal priorities from response to readiness

Question 3. What actions should Congress take to facilitate an efficient and effective Federal role in water supply?

Based on the above information, observation and experience, there are some basic ways in which the Federal Government could help the country resolve some of the water supply challenges. They include the following:

- Support a National Drought Preparedness Act, to create an ongoing Federal and non-Federal coordination and collaboration entity, with both administrative and program implementation funding;
- Implement the recommendations of the National Drought Policy Commission report, including:
  - Shifting Federal priorities from response to planning and preparedness, reflected in funding decisions and incentives for regional Federal and non-Federal water supply coordination entities;
  - Provide incentives for scientists and managers to collaborate to enhance observation networks, monitoring and prediction and information delivery of pertinent water supply information;
  - Maintain a safety net of emergency relief, that emphasizes sound stewardship of natural resources and self-help;
  - Develop and enact a Federal practice of multi-jurisdictional conflict resolution and alternative dispute resolution;
- Conduct a national assessment of the potential to use a regional approach to developing water supply plans and solutions, including resource assessment, economies of scale, watershed basis, and stakeholder input processes.
- Develop and fund a Federal practice of multi-jurisdictional conflict resolution and collaboration with non-Federal partners and participants.
  - Re-evaluate the ability of any single agency to veto coordinated plans to meet water supply needs.

In addition to the broad topics addressed above, the water industry has gone on record regarding some specific measures, which are applicable to this discussion. They include specific actions by the Federal Government that would help facilitate some water supply solutions, without undermining the shared goal of protecting environmental and ecological resources.

- Under the general category of better coordinated and integrated water statues and programs:
  - Develop effective, scientifically sound and adequately funded programs to control polluted runoff.
  - Amend the Clean Water Act to make protection of drinking water sources one of its main purposes and to specifically address drinking water contamination by non-point and other sources.
  - Develop water quality criteria for microbial pathogens and all other pollutants subject to the Safe Drinking Water Act, to limit the introduction of microbial pollutants into the drinking water supplies.
- Amend Superfund to more effectively protect and remediate drinking water sources.
- Change the Clean Air Act to prevent contamination of drinking water supplies by MTBE and other oxygenates.
- In reauthorizing the Endangered Species Act (ESA), the American Water Works Association (AWWA) recommends:
  - Develop a public policy review process that balances species protection with the provision of public services essential to public health, safety, and welfare.
  - Allow for upfront agreement on reasonable and necessary preventive or emergency repairs, maintenance and safety modifications on existing water projects.
  - Recognize the rights and responsibilities of the owners of existing water rights.
  - Ensure that ESA decisions are based on peer-reviewed science conducted by acknowledged, independent experts in an open, transparent, and interactive process.

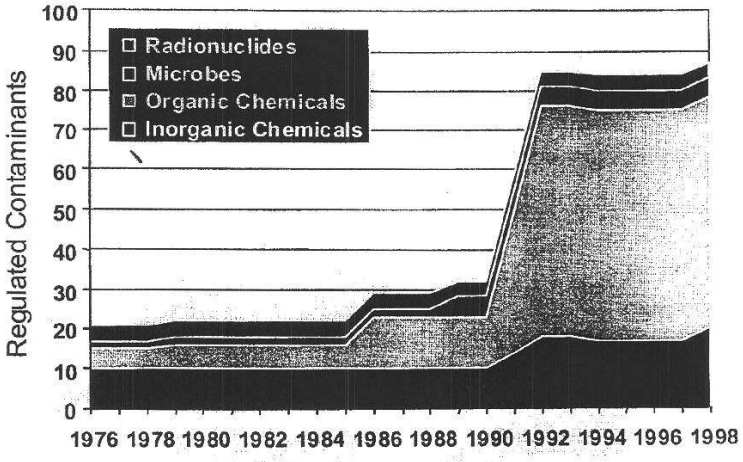
In summary, the questions you raised are relevant and needed to be raised. The solutions are not easy, but still need to be implemented. While there may be diverse water supply needs across the country, I believe you will find a host of individuals, groups and entities that will welcome the opportunity to be part of the solution. I appreciate the opportunity to provide testimony on this important topic and wel-

come the opportunity to answer questions, provide additional information or other means to further these endeavors.

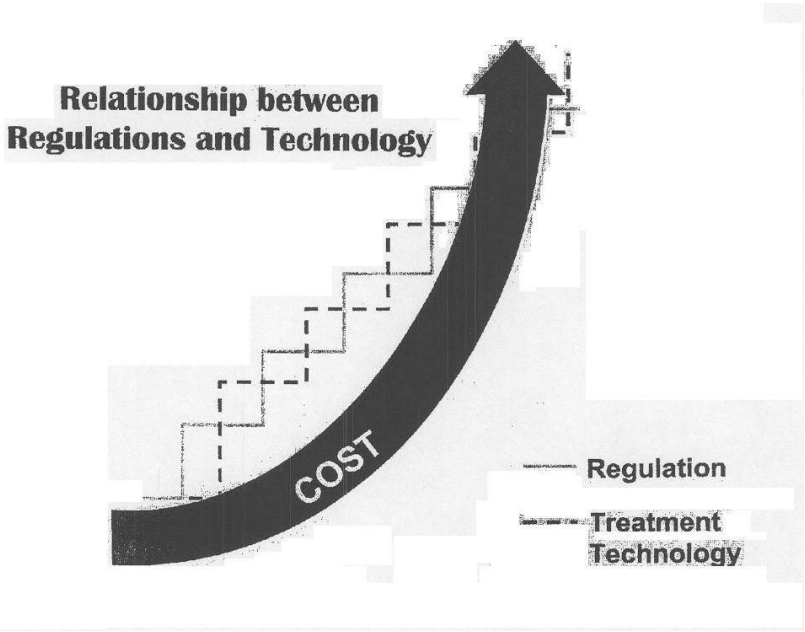
Attachment

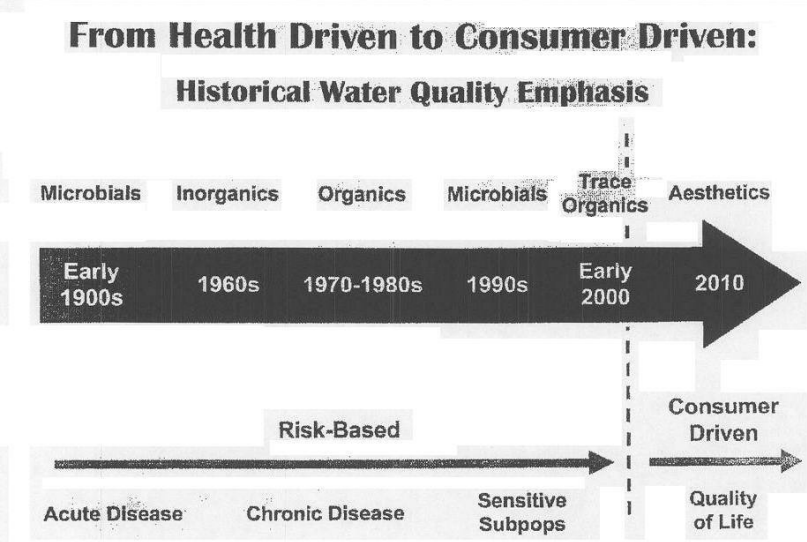
- Water Availability by state
- Water Quality regulation impacts

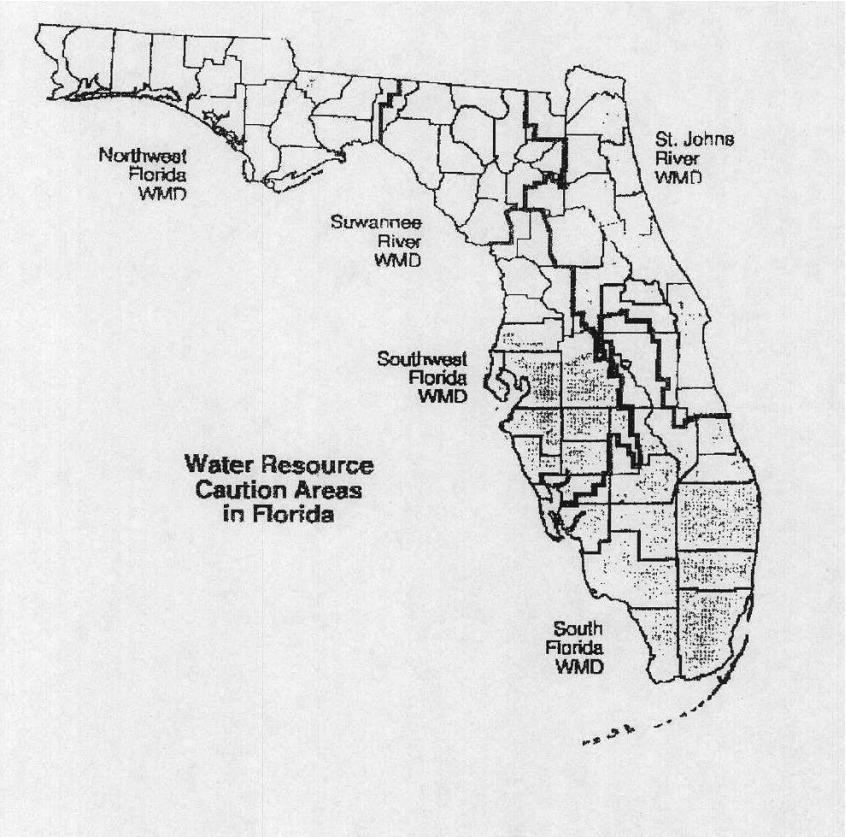
Number of Contaminants Regulated by Safe Drinking Water Act



Source: U.S. EPA Report# 816-R-99-007


Relationship between
Regulations and Technology
COST
Regulation
Treatment
Technology


From Health Driven to Consumer Driven:
Historical Water Quality Emphasis
Microbials
Inorganics
Organics
Microbials
Trace Organics
Aesthetics
Early 1900s
1960s
1970-1980s
1990s
Early 2000
2010
Risk-Based
Consumer Driven
Acute Disease
Chronic Disease
Sensitive Subpops
Quality of Life



Water Availability Issues for Bureau States

- Drought conditions in western Texas
- Extreme drought in Trans-Pecos climate division in Texas and in southeastern New Mexico
- Recent locally heavy rains in northeastern Oklahoma an improvement to drought conditions

Water Availability Issues for Bureau States (cont.)

- Drought designation expanded for parts of the Northwest and northern Rockies
- Wildfire potential still above normal for all of California and normal for Nevada

Water Availability Issues for Non-Bureau States

- Alabama -- Decline of groundwater levels by 100 feet due to pumping
- Alaska -- Permafrost decreases access to groundwater
- Arkansas -- Decline of groundwater levels by 60 to 300 feet due to pumping
- Connecticut -- Surface water cannot meet demands and SDWA requirements

Water Availability Issues for Non-Bureau States (cont.)

- Delaware -- Decline of groundwater levels by as much as 150 feet
- Florida -- Decline of groundwater levels by as much as 150 due to pumping, and coastal area salt water intrusion
- Georgia -- Surface and groundwater supplies not readily available near large cities, and coastal area salt water intrusion

Water Availability Issues for Non-Bureau States (cont.)

- Hawaii -- Water resources susceptible to prolonged droughts
- Illinois -- Decline of groundwater levels by more than 850 feet in northeastern state due to pumping, and surface water inadequate during drought in southern two-thirds of state
- Indiana -- Decline of groundwater levels by 20 feet due to Ag pumping

Water Availability Issues for Non-Bureau States (cont.)

- Iowa -- Groundwater not available in southern part of state, surface water deficiencies during drought, and Missouri River changes have lowered levels in wetlands and lakes
- Kentucky -- Some areas with inadequate groundwater, and surface water inadequate during drought

Water Availability Issues for Non-Bureau States (cont.)

- Louisiana -- Decline of groundwater by as much as 430 feet in southern, and central state and several rivers have low flows restricting surface water availability
- Maine -- Existing and potential surface and groundwater sources not sufficient for southern state

Water Availability Issues for Non-Bureau States (cont.)

- Maryland -- Decline of groundwater levels by as much as 85 feet in south state
- Massachusetts -- Groundwater withdrawals for public water supply may lower levels in eastern state
- Michigan -- Groundwater inadequate in northern state during droughts

Water Availability Issues for Non-Bureau States (cont.)

- Minnesota -- Irrigation and domestic users competing for groundwater
- Mississippi -- Decline in groundwater levels along Gulf coast, northeastern, and western state due to pumping
- Missouri -- Decline in groundwater levels by several hundred feet in southwestern state due to pumping

Water Availability Issues for Non-Bureau States (cont.)

- New Hampshire -- Inefficient distribution system can cause water supply to not meet treatment standards and result in shortages
- New Jersey -- Surface water supply to northern state only adequate when precipitation > average, and parts of state aquifers not fully used due to environmental/institutional constraints

Water Availability Issues for Non-Bureau States (cont.)

- New York -- Decline of groundwater by 18 feet and decreases in stream flow by 90% in parts of Long Island, and droughts can cause inadequate water supply in New York City
- North Carolina -- Approaching surface water supply limits in the Piedmont area, and coastal plain aquifers declining and experiencing saltwater intrusion

Water Availability Issues for Non-Bureau States (cont.)

- Ohio -- No issues identified
- Pennsylvania -- No issues identified
- Rhode Island -- Water supply systems cannot meet demands during droughts
- South Carolina -- Scarce groundwater in Piedmont areas with reliance on variable surface water, and declining groundwater in southern state from Ag pumping

Water Availability Issues for Non-Bureau States (cont.)

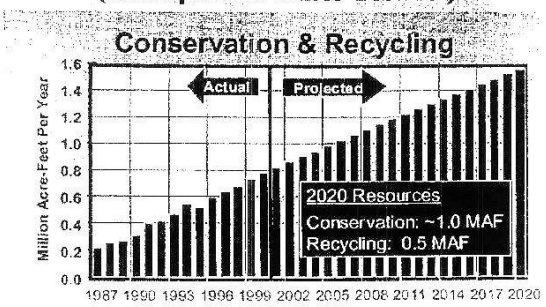
- Tennessee -- Subject to surface water shortages in eastern and central state during droughts
- Vermont -- No issues identified
- Virginia -- Water supplies not sufficient for future demands in southeastern state, and decline in groundwater up to 200 feet in some areas

Water Availability Issues for Non-Bureau States (cont.)

- West Virginia -- Surface water shortages in southern state during drought
- Wisconsin -- Decline in groundwater up to and exceeding 100 feet in eastern and southeastern state due to pumping

Example -- Successful Regional Overall Resource Strategy (cont.)

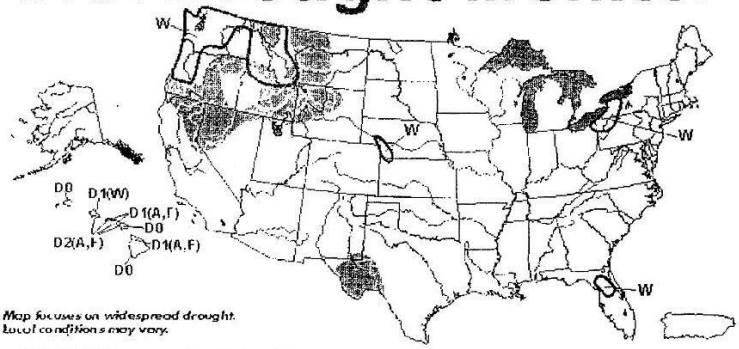
(Metropolitan Water District)



Regional Investments:	As of 2000	By 2020
Conservation	$220 mil	$1,300 mil
Recycling	$1,200 mil	$4,100 mil
Total	$1,420 mil	$5,400 mil

November 6, 2001 Valid 8 a.m. EST

U.S. Drought Monitor



Map focuses on widespread drought. Local conditions may vary.

D0 Abnormally Dry
D1 Drought–Moderate
D2 Drought–Severe
D3 Drought–Extreme
D4 Drought–Exceptional
Delineates Overlapping Areas

Drought-Impact Types:
A = Agriculture
W = Water (Hydrological)
F = Fire danger (Wildfires)
(No type = All 3 impacts)

USDA

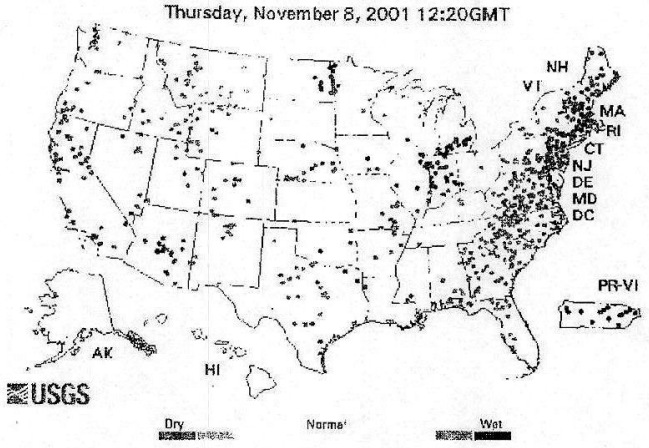
See accompanying text summary for forecast statements
http://enso.unl.edu/monitor/monitor.html

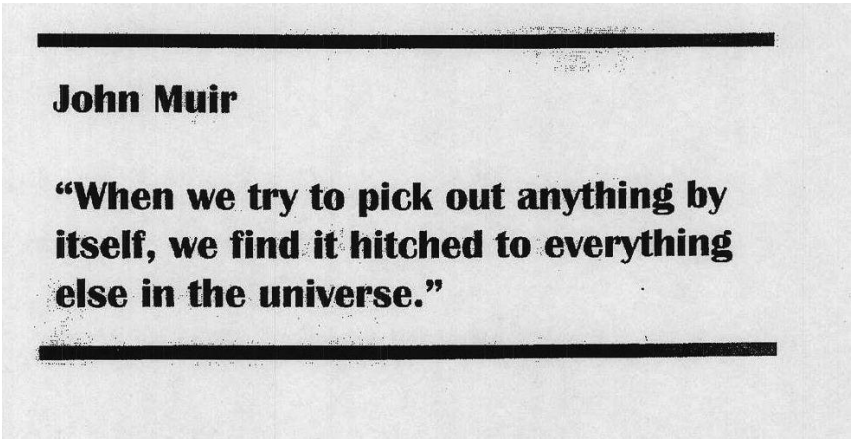
Released Thursday, November 8, 2001

Author: Michael Hayes, NDMC

Map of real-time streamflow compared to historical streamflow for the day of the year (United States)

Thursday, November 8, 2001 12:20GMT





RESPONSE BY ANE D. DEISTER TO ADDITIONAL QUESTIONS FROM SENATORS GRAHAM AND CRAPO

Question 1. In your testimony, you identified a need for a shift in Federal priorities from assistance for response or "bailouts" to readiness. How would this shift in Federal priorities to readiness occur? How would this work within the framework that recognizes and defers to States and localities for water supply management development?

Response. The simple answer is through a shift in funding priorities. Currently after-the-fact response programs, which are responsive in nature, often receive funding either through emergency provisions, or in the case of natural-based disaster through Stafford Act provisions with FEMA. Both grant and loan programs would ensure State and local rights, restrictions and priorities are maintained, as well.

My suggestion is for a systematic, staged shift in Federal funding such that Federal loan and grant funds for drinking water, recycled water, and conservation projects and programs are increased over a 10-year period, with concomitant reductions in funds allocated for response measures. In this way communities and utilities may plan and prepare for increased water demands from a growth management perspective that would maximize water conservation and facilities planning approaches systematically, in a cost effective and resource effective manner, to prevent emergency or other more costly situations. Eligible facilities and programs might include treatment plants (and upgrades to address water quality matters), storage (above and below ground) facilities, canal and conveyance lining and rebuilding, system audits, managed irrigation measures, residential, commercial, industrial and institutional conservation retrofits and other conservation and recycling activities. There are other cross resource opportunities that might be considered as well. For example, one of the major costs in water operations is electricity. There may be some energy efficient measures such as co-generation, use of "green" power and other measures that would contribute positively to two resource challenges simultaneously. Certainly, Federal incentives would be helpful.

Again, this is the simple answer, and I would be pleased to provide additional information as well. I look forward to working with you and the committee on this important resource challenge. Management of fresh water resources is rapidly becoming one of the most pressing matters of our time. Steps to pro-actively prepare for new demands, couple with wise use of existing supplies will help us continue to provide water to fuel the economy, support and restore the environment. I welcome other invitations to be part of this effort nationally.

STATEMENT OF JAY L. RUTHERFORD, P.E., DIRECTOR, WATER SUPPLY DIVISION, VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION, ON BEHALF OF THE ASSOCIATION OF STATE DRINKING WATER ADMINISTRATORS

INTRODUCTION

The Association of State Drinking Water Administrators (ASDWA) is pleased to provide testimony before the Senate Environment and Public Works Subcommittee on Fisheries, Wildlife, and Water regarding the Federal role in meeting water supply needs. ASDWA represents the drinking water programs in each of the 50 States, territories, and the District of Columbia in their efforts to ensure the provision of safe, potable drinking water to all Americans nationwide. ASDWA's primary mission is the protection of public health through the effective management of State drinking water programs that implement the Safe Drinking Water Act.

OVERVIEW

For more that 25 years, State drinking water program administrators have been involved in issues primarily relating to water quality rather than quantity, although a reliable source of drinking water is a prerequisite for good public health protection. ASDWA's members carry out regulation of public drinking water systems that serve 25 or more people per day. Public water systems have the benefit of both Federal and State regulation and this oversight typically provides for improved source protection, planning, and operation of those systems to the benefit of the consuming public.

In response to the questions posed by the subcommittee, ASDWA polled its member States regarding the adequacy or capacity of their public water supplies. The responses received emphasized that each State's situation is unique.

Is there a water supply problem?

Declared drought conditions exist in all or portions of approximately half of the States. States generally concurred that these conditions either do or will affect the supply of available drinking water. From ASDWA members' perspective, the primary cause of stressed water supplies is weather-related—principally a lack of rainfall or snowpack. Some States also reported stresses attributable to population growth; competition for use among agricultural, manufacturing, and environmental initiatives; and, in some areas, stress due to development, although this issue was much less significant than stresses caused by the weather.

Most States have developed, or are developing, management systems to address the reliability of their water supply. These efforts usually involve coordination among a variety of State and local agencies and, as needed, further coordination with selected Federal agencies. Slightly more than half of State drinking water programs are housed in Departments of Environment or Natural Resources, generally the State agency responsible for water supply management. The remaining State programs fall under the purview of Departments of Health where water supply management is not part of the program=s mandate. This distinction has led to a variety of lead agencies with regard to primary responsibility for water quantity issues. However, State drinking water programs, regardless of their location, all contain initiatives directed toward source water assessment and delineation as part of their responsibilities under the 1996 Amendments to the Safe Drinking Water Act (SDWA).

What is the appropriate Federal role?

The 1996 SDWA Amendments offered State drinking water programs several opportunities to respond with enhanced flexibility to Federal requirements in a manner that targeted specific State needs and recognized that States frequently know how best to manage their resources responsibly. Federal water supply management initiatives may benefit from a similar approach. Water supply management is, of necessity, very different east and west of the Mississippi River.

In the East, water supplies are generally more plentiful. States recognize, however, that plentiful does not mean unlimited. Many States already have well-and long-established interagency working relationships primarily to address drought but also to look at broader water management issues such as protection against contamination and/or smart growth. Many States have developed water management and conservation plans to respond to immediate short-term concerns such as water outages as well as longer range coordinated mechanisms to ensure continued sufficient water supply.

For example, Georgia is developing a State Water Plan and a State Drought Plan that includes regional drought management models and a statewide comprehensive water conservation plan. As well, Georgia is studying ways to reduce agricultural

water use while still protecting the prosperity of farmers and agricultural communities. These initiatives call upon the combined State level expertise of the Department of Natural Resources through both the Pollution Prevention Division and the Environmental Protection Division, the Departments of Wildlife Resources and Community Affairs, the Georgia Emergency Management Agency, the Georgia Association of County Commissioners, and the Georgia Municipal Association. Federal participation is principally through the U.S. Army Corps of Engineers.

In Tennessee, the State has enacted legislation that will require registration and permitting for all interbasin transfers of water. A special panel has been created to consider water supply policies for the State. Tennessee expects that water supply legislation to conduct an inventory of water availability will be introduced and considered during the next legislative session. To respond to drought and other water shortage situations, the Department of Environment and Conservation works in collaboration with the State offices for economic and community development, policy and planning, and municipal pollution control. At the Federal level, Tennessee works with the Tennessee Valley Authority, Corps of Engineers, and the Environmental Protection Agency.

Vermont, in contrast, has taken a different approach. The State's policy is to encourage rather than mandate water conservation initiatives at the local level. Conservation is perceived as a locally managed issue. However, for a number of years, Vermont has taken a conservative approach toward allowing development of new public drinking water sources. This long range planning effort has been instrumental in reducing drought impacts for those systems. Additionally, the State requires that all community water systems develop a Source Protection Plan which includes a contingency plan to address system failures and outages.

Other States such as Connecticut, Rhode Island, and Minnesota require that all public water systems serving, generally, a population of 1,000 or more develop water management plans as part of the permitting process. Although drinking water is regulated under the Department of Health in these three States, each program is directly involved in working with the Department responsible for water supply management to address drought and conservation initiatives.

In the West, water supply management has a very different history and tradition. Because supplies are so limited, water use has been bound by a complex allocation scheme known as water rights. Much of the water supply in the Western United States is controlled by the U.S. Bureau of Reclamation through its oversight and management responsibilities for Federal dams and reservoirs. Additionally, the U.S. Fish and Wildlife Service plays a critical role in water supply allocation as it strives to provide sufficient water to support endangered marine and other species. The Corps of Engineers also play a significant role in its management and restoration of wetlands as well as its more traditional dredging activities.

Western States face unique water supply management challenges due to these water rights issues that force irrigated agriculture, technology and other industries, fish and wildlife, and the consuming public into an ongoing struggle for severely limited supplies. The significant level of Federal involvement adds yet another layer to the mix. However, States have proved adequate to the challenge through water management and conservation plans designed to address the needs of their particular combinations of geography, population, and limited sources of supply.

States in the West have worked diligently to find the appropriate balance that addresses the concerns of these competing interests. California, for example, has its longstanding State Water Project that addresses supply concerns between the northern and southern regions of the State. California also participates in a State/Federal water supply partnership and has designed several regional and individual efforts to increase supply through water reuse, water banking, and increased surface storage systems. Additionally, California requires that any developer of a project with more than 500 service connections must identify an appropriate water source before receiving approval to proceed.

The State of Washington, too, is working diligently to resolve some of its supply issues through adoption of smart growth plans, increasing water reuse capabilities, and developing water management plans. The State is working to determine how best to integrate these efforts and how to incorporate additional fish protection requirements into a comprehensive management strategy. The State expects that its next legislative session will focus largely on water supply management issues for public water providers as well as consideration of issues such as utility responsibilities for environmental management, water use efficiency, and water system infrastructure funding.

Arizona has had a comprehensive water resource management plan in place for more than 20 years. The plan requires State regulation of groundwater use to ensure that dependable water supplies are available for current and future use. The

plan places conservation requirements on both municipal and agricultural water use and promotes renewable water supplies. The State's Department of Environmental Quality has modified its regulations relating to reuse of effluent to allow more reuse while maintaining necessary water quality standards; thereby conserving potable water sources for human consumption and domestic uses.

Each of these Western States has designed a water management plan that addresses its unique needs—whether it be water transfers between northern and southern California; water management plans to coordinate competing uses in water-rich Seattle or high desert Spokane, Washington; or water conservation planning and management for the arid Arizona desert. Each has developed a methodology that incorporates collaboration between and among different State agencies as well as cooperation with a host of Federal agencies and inclusion of public input through stakeholder involvement.

In the drinking water arena, each of these States has also developed a plan for source water assessment and protection. These initiatives will allow States to further coordinate their water supply management activities through identification of areas that may need increased protection from contamination; areas that should not be developed as part of a prevention approach to protection; and the ability of source water protection initiatives to assist in directing State determinations for appropriate smart growth and other land use decisions.

The clear message from State drinking water programs is that water supply matters must be addressed primarily at the State and local level. Federal involvement with the States should be limited to a facilitative role in meeting the interest of the States.

What, if any, actions should Congress take?

State drinking water programs are reluctant to provide legislative advice or direction on matters not typically under their purview. ASDWA can recommend continued congressional support for programs such as the source water protection initiatives found within the SDWA that carry many incentives for participation, few overarching regulatory mandates, and allow States to pursue compliance strategies tailored to their individual needs. One of the best methods of support for these flexible programs is increased funding for the Drinking Water State Revolving Loan Fund (DWSRF). The DWSRF allows Federal funding, coupled with a 20 percent State match, to create a loan program that distributes much needed infrastructure improvement dollars to qualified applicants as well as offer drinking water utilities the means to work toward protecting their drinking water sources; identifying and removing potential sources of contamination; and establishing reasonable land use or smart growth strategies. Each of these initiatives demonstrates an approach to effective water supply management. All are possible due to the flexibilities offered under the DWSRF for source water protection.

ASDWA also reiterates that each State is unique in its needs, strategies, and solutions. States are in the best position to manage and coordinate the multi-level efforts among Federal, State, and local perspectives. As well, States are best positioned to balance competing priorities among local communities, interest groups, and Federal agencies as they are the only entity to have direct responsibilities to each of the participating parties. Tensions are often exacerbated when longstanding State-local working agreements are overridden by Anew or revised Federal mandates that can Aundo compromises that took years to reach. Almost without exception, States have programs in place to address drought conditions as well as water management plans that represent years of effort to reach a delicate balance that fairly represents competing interests.

History has taught us that without cooperation in water supply management efforts, the economic consequences will be dire. Direct Federal intervention is not the only, and frequently not the best, solution. States must be allowed to manage their own resources—they are the primary stewards—and are responsible to the public that they serve.

ASDWA appreciates this opportunity to provide information to the Subcommittee. ASDWA believes that each State faces unique challenges in addressing the issues surrounding water supply management. States have developed coordinated efforts that incorporate local and Federal perspectives within the construct of identified State needs. The Federal role should be both facilitative and supportive of these ongoing initiatives. From a drinking water perspective, one of the best ways to accomplish this is for continued Federal support for programs such as the DWSRF that offers the incentives and financial wherewithal to address identified water supply issues.

STATEMENT OF KENNETH FREDERICK, SENIOR FELLOW, RESOURCES FOR THE FUTURE[1]

Thank you Chairman Graham, Ranking Member Crapo, and members of the subcommittee for the opportunity to testify on the Nation's water supply issues. I am Kenneth Frederick, Senior Follow at Resources for the Future, a nonprofit, nonadvocacy research and educational organization specializing in problems of natural resources and the environment since 1952. The views I express today are my own, not those of RFF.

The United States is relatively well endowed with water, with an average annual precipitation of nearly 30 inches throughout the conterminous 48 States and large quantities of water stored in surface and groundwater reservoirs. Despite water's apparent abundance and renewability, water adequacy has emerged as one of the Nation's primary resource issues. Freshwater is a scarce and often threatened resource throughout much of the United States, but particularly in the and West. Supplies are being depleted or degraded by unsustainable rates of groundwater use, contamination, and damage to aquatic ecosystems.

Concerns about the availability of freshwater to meet the demands of a growing and increasingly affluent population while sustaining a healthy natural environment are based on several factors: (1) the importance of reliable supplies of high-quality water for human and environmental health and economic development; (2) uncertainties as to the availability of supplies stemming from the vicissitudes of the hydrologic cycle and the threat that greenhouse warming might alter the cycle; (3) the high costs of developing additional supplies; (4) the Vulnerability of the resource to contamination; and (5) the shortcomings of our institutions for allocating scare supplies in response to changing supply and demand conditions.

My remarks will focus on the implications of greenhouse warming and the institutional shortcomings, I will leave the committee with several papers that provide a more extensive discussion of these and other factors affecting the Nation's water supplies.

HYDROLOGIC IMPLICATIONS OF GREENHOUSE WARMING

Greenhouse warming could affect the quantity, quality, timing, location, and reliability of water supplies, The effects on water supplies and water management systems are expected to be among the most important impacts of global warming. But understanding the linkages between emissions of greenhouse gases and sulfur dioxide (which has a cooling effect) and the climate, and then determining how climate change would affect water resources at geographic scales relevant for water planning and management arc daunting tasks. Contrasting projections of runoff (that is, our renewable supplies) based on the two principal general circulation models used in the recent national assessment of the impacts of climate variability and change on the United States illustrate the uncertainties. Estimates based on the Hadley climate model indicate flooding could increase in much of the country, while those based on the Canadian model indicate increased water scarcity would pervade much of the country.

While the wide range of projections from the different climate models makes it difficult to draw Conclusions at the river basin and watershed levels, some general conclusions about the likely impacts of greenhouse warming on water supplies do emerge.

- Precipitation is likely to increase in higher latitudes, particularly in winter.
- Higher evapotranspiration rates may lead to decreases in runoff, even in areas with increased precipitation.
- More intense precipitation days are likely in some regions, which could contribute to all increase in flood frequency.

1• The frequency and severity of droughts could increase in some areas as a result of a decrease in total rainfall, more frequent dry spells, and greater evapotranspiration.

- Higher temperatures would shift the relative amounts of snow and rain along with the timing of runoff in mountainous areas. This shift could increase the likelihood of flooding early in the year and reduce the availability of water during periods of high demand.
- Higher temperatures and reduced flow could increase water quality problems in some basins.
- The quality and quantity of freshwater in coastal areas might be adversely affected by higher sea levels and increased storm surges that push saltwater further inland in rivers, deltas, and coastal aquifers.

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[1] Resources for the Future, 1616 P St., NW, Washington, DC 20036 (email: frederic@rff.org).

WATER INSTITUTIONS

There is cause for concern over the adequacy of our water supplies. We have limited control over the resource, most opportunities for increasing supplies are financially and environmentally costly, current uses are depleting or contaminating some valued supplies, and the prospect of climate change introduces new uncertainties. Meanwhile, demands for freshwater are growing with population and incomes. And many of the institutions that provide the opportunities and incentives to use, conserve, or protect the resource continue to be rooted in an era when the resource was not considered to be scarce.

On the other hand, there is reason for optimism as to the long-term adequacy of water supplies. The institutions that influence how supplies are managed and allocated among competing users and the effectiveness and costs of efforts to protect aquatic environments and drinking water quality will determine the magnitude and nature of future water costs.

State institutions are primarily responsible for allocating waters within their borders. But water flows do not conform to State boundaries. As the competition for water increases, all users within a hydrologic unit become increasingly interdependent. Consequently, Federal input is needed to promote water use efficiency and protect the interests of downstream States. The Federal Government currently manages much of the West's SUIT, waters, Supplies water to about one quarter of irrigated lands there, and is the source and enforcer of environmental legislation affecting water use, the trustee for Indian water rights, and the holder of unquantified rights for water use on Federal lands. Carrying out these responsibilities to better meet the Nation's future water needs will be a major challenge. Some recommendations follow.

Water marketing, the voluntary transfer of water rights to new uses and users, has great potential to increase water-use efficiency, The Federal Government has taken a few steps to facilitate water marketing. The Department of Interior adopted a policy of facilitating transfers involving Federal facilities and established a framework for approving and administering interstate agreements for water transfers among the three Lower Colorado Basin States. The Central Valley Project Improvement Act of 1992 authorized the transfer of federally supplied water outside the project service area. However, these measures have had little or no impact on water use to date. A broader, more active Federal role is needed.

Uncertainties surrounding unquantified Indian and federally reserved water rights hinder the assignment of transferable water rights. Providing the tribes with rights that could be sold off the reservations would foster water marketing as well as tribal welfare. Temporary and permanent transfers of federally supplied water could be promoted to facilitate transfers from low-value, inefficient agricultural uses to domestic and industrial uses. Providing irrigators an opportunity to sell unused supplies would promote transfers from low-to high-value uses and would provide irrigators incentives to conserve. With the introduction of transferable water rights, users would value water in terms of its opportunity cost—the value they could get by selling water—rather than the subsidized price they pay for it.

The prospect of global climate change provides added reason for promoting water transfers and making the operation of Federal dams and reservoirs more responsive to changing conditions. The magnitude, timing, and even the direction of climate-induced changes in a region's water supplies are uncertain. The costs of building dams, reservoirs, and other infrastructure in anticipation of these uncertain changes are high. But reexamining operating rules, relaxing constraints on water use, and developing institutions to encourage voluntary exchanges of water through markets would make the system more efficient and better able to adapt to whatever the future might bring.

The United States has made impressive gains over the last two decades in restoring and protecting its water resources. But resistance is growing to the enormous investments that continue to be made in treating industrial and municipal wastes because of high costs and diminishing returns. More cost-effective approaches to water-quality goals are needed. These might include effluent fees that provide incentives to develop and adopt least-cost technologies, and tradable permits to pollute that establish an allowable quantity of pollution in a watershed and provide incentives to achieve this level at the lowest cost. Nonpoint Source pollutants—such as runoff from farms, urban areas, and constructionsites, and seepage from landfills and septic systems—are now the principal sources of pollutants reaching the Nation's waters. Since these pollutants lack specific points of discharge where they can be collected and treated, watershed management with particular emphasis on the use of riparian or riverside lands must be employed to achieve significant further improvements in the quality of the Nation's waters.

The interdependencies among water users and the interchangeability of ground and Surface Supplies are all too often ignored in management decisions because natural hydrologic regions are split into multiple political and administrative units. Integrated management of existing supplies and infrastructure, ideally at the river basin level but also within smaller watersheds, could be a cost-effective means of increasing reliable water supplies and resolving water conflicts in many regions. Perhaps the most important measure that Congress could take to meet the Nation's long-term water needs would be to restore the Water Resources Council or a similar institution. Such an institution is needed to evaluate water investment and management decisions objectively from the perspective of their impacts on larger watersheds, to assess the third-party impacts of interstate water transfers, to counter the often conflicting objectives of differing Federal agencies, and to reduce (or at least expose) the inefficiencies that result from political logrolling and agency aggrandizement.

Thank you for your attention. I would be pleased to address any questions the committee might have.

STATEMENT OF LELAND R. MINK, DIRECTOR, IDAHO WATER RESOURCES RESEARCH INSTITUTE

Mr. Chairman: My name is Leland Mink. I am Director of the Idaho Water Resources Research Institute at the University of Idaho in Moscow, Idaho. In addition, I am past president of the National Institutes for Water Resources (NIWR) and a member of the Board of that organization. NIWR represents the State water resources research institutes, which are partnerships among State universities; Federal, State, and local governments; businesses and industries; and non-governmental organizations aimed at solving problems of water supply and water quality at local, State, regional, and national levels.

By way of background, the Water Resources Research Act of 1964 which authorized establishment of a water resources research and technology institute or center which tend to be at the land-grand university in each State. These institutes were charged with (1) arranging for competent research that addresses water problems or expands understanding of water and water-related phenomena, (2) aiding the entry of new research scientists into the water resources fields, (3) helping to train future water scientists and engineers, and (4) getting the results of sponsored research to water managers and the public. The institute in each State is responsible for working with researchers at other universities within their State.

Congress passed Public Law 106–374 last year. The legislation reauthorized the Water Resources Research Act through fiscal year 2005. The legislation is under the jurisdiction of the Committee on Environment and Public Works. The principal sponsor of last year's reauthorization was Senator Crapo.

The State Water Resources Research Institute Program is under the general guidance of the Secretary of Interior and is administered through the U.S. Geological Survey.

Over the past 40 or more years, several reports have been submitted to Congress attempting to address the questions of "Do we have enough water?" and "Are we running out of water?" Interestingly, the Senate Select Committee on National Water Resources, the so-called Kerr Committee, provided one of the earlier reports to Congress in 1961. (See Senate Report No. 29, 87th Congress, 1st Session).

Two major water assessments were conducted in 1965 and 1978 by the Water Resources Council (See U.S. Water Research Council, 1968, *The Nation's Water Resources: The First National Assessment of the Water Resources Council*, and U.S. Water Research Council, 1978, *The National Water Resource Second National Assessment*). Just this year, the National Research Council of the National Academy of Sciences issued a brief report on the research and information needs for assessing water availability and use. (See *Envisioning the Agenda for Water Resources Research in the Twenty-First Century*, National Research Council 2001).

All of these studies consistently indicate an inadequate water supply to meet future needs. They have suggested ways to potentially develop more resources. Examples include wastewater re-use, desalinization, water conservation, etc. The studies also indicated a need for improved hydrologic data to develop management plans and better able to make management decisions. This all leads to developing the information and techniques to make better forecasts, especially as related to extreme conditions such as drought periods and flood frequency.

In Idaho, as in many of the Western States, water management has changed over the last 30 years, especially with the additional priorities. Early management strategy was to create more storage so water could be made available for basic needs

of hydropower generation, food production and domestic consumption and use. During the past 30 years a shift has occurred to add consideration of environmental concerns as a major need. Primary examples include minimum stream flows for aquatic species, which are important to salmon and other fisheries in our region, and recreation in streams and rivers which has become an important consideration driving managing streams and reservoirs which are primarily used for traditional hydropower and irrigation purposes. As a more diverse population growth occurs in the Western States, new priorities surface for the available water. As a result, the perception (and often reality) is there is not enough water to satisfy the existing and projected demands. The major issue facing water managers in the 21st century will be inadequate and uncertain water supplies.

Demands on the Nation's water resources are growing with increased population and industrial expansion. Since the supply is unchanged (with exception of climate change impacts) it indicates that we will face increased challenges in meeting growing demands. The degree of the problem, or challenge, is certainly associated with different regions of the country. Initially, the challenges are addressed by re-allocation of water among competing demands, with higher value demands (e.g., potable use) being supplied by discontinuing lower value uses such as irrigation. This reallocation has social, economic and hydrologic effects and should be thoroughly and carefully evaluated. In some portions of the country there are few alternatives for reallocation or alternative supply. It is certainly important for the Federal Government to understand that demand is exceeding supply. Likewise, it must work with States and local communities to develop alternatives to meet existing and projected water demands.

Taking the fact that past national water supply studies have been rather quantitative and describe large basins, the local and State water managers feel these projections have been of little use. Past national water assessments have been used primarily by Federal agencies and by technical people, such as hydrologists and engineers, but they have only been used to a limited extent by biologists and social scientists (See Osborne & Shabman, *The Use of Water Resource Information: the Second National Water Assessment*, 1988).

Many water managers in the West feel water information and research certainly needs to be continued and there is a Federal role in supporting this effort. Information needs to be targeted to the users not only at the Federal level but also at the State and regional levels. There is also a strong feeling in the West that water management decisions are best made at these levels. Water information related to water quantity and water quality should be designed to help meet these State and regional needs. As cited in Osborne & Shabman in 1988 and still holds true today "use of the assessment means that its costs are justified by benefits received to the users." These benefits should extend beyond the needs of Federal agencies.

Congress should take the role of first evaluating the potential for water supply crises throughout the Nation and then provide funding to critical areas for further analysis and evaluation of alternatives. Examples of items which Congress should consider to facilitate an efficient and effective role include:

- Develop and improve new and innovative supply enhancing technology
- Assess safety of waste water reuse
- Develop innovative technologies to prevent pollution
- Increase ability to forecast water availability and future impacts such as climate change and land use changes
- Encourage and support regional and State water planning
- Support hydrologic data collection efforts at the Federal level in cooperation with State and regional agencies and groups
- Encourage and support regional characterization studies both in high population and rural areas

In conclusion, I know that my fellow water resources research institute directors commend Congress for the recommendation contained in the fiscal year 2002 Interior Appropriations Act. The Act directs the USGS to undertake a report describing the scope and magnitude of efforts needed to provide periodic assessments of the status and trends in the availability and use of freshwater resources. In addition, we also support the congressional recommendation for a National Academy of Sciences study to examine Federal and non-Federal water resources research funding and the allocation of resources currently deployed in support of water research programs. This seems to be a logical way to develop data to understand whether we, as a Nation, are making an adequate investment in water resources research.

The following are several example of water supply research conducted in some of the State water resources research institutes that may be of interest to members of the Subcommittee:

• To address the problems of aquifer decline and decreased river flow, the Idaho Department of Water Resources (IDWR) is studying possible scenarios for managing the Snake River Plain Aquifer and is getting modeling help from the Idaho Water Resources Research Institute. Dr. Gary Johnson and Ms. Donna Cosgrove have developed numeric functions that describe the relationship between groundwater use and river depletion for each cell of a groundwater flow model of the Snake River Plain Aquifer. They have developed a spreadsheet that water managers can use to see how reduction of groundwater pumping at specific locations will affect the springs and the river. The State has adopted these tools for aquifer management planning and plans to use them to develop State water management regulations.

• In Nevada, a statewide reconnaissance of water resources was undertaken during the 1960's and early 1970's. The results continue to provide the basic information for planning and development decisions faced by resource managers at both local and State levels despite their design as reconnaissance-level efforts. Technological development and introduction of new investigative tools now provide the opportunity for more accurate assessment of available resources. Application of these tools has often indicated that significantly more water is available than previously believed in central Nevada and in southern Nevada. The Nevada Water Resources Center has played a key role in this effort.

• In arrid regions of the United States, water conservation and reuse are issues that receive a great deal of public attention. The search for ways to responsibly use and reuse water is vital to the sustainability of the water supply and thus the future of these areas. Wastewater treatment and reuse is one of the best water conservation options available to communities located in arid areas. Many large-scale reuse efforts have been developed, such as the watering of golf courses with treated municipal effluent or the use of effluent for groundwater recharge. But the potential for wastewater reuse is not limited to large-scale projects supplied by community wastewater treatment facilities. It is also available to individual homeowners. Graywater recycling offers a way in which people can save and reuse the wastewater generated in their own home.

To add to the understanding of and clarify the issues surrounding the safe and effective use of household graywater, in 1998 the Arizona Water Resources Research Center began an in-depth study of residential graywater reuse in the greater Tucson area. The study, supported by the Arizona Department of Water Resources, the Arizona Department of Environmental Quality, and the Pima County Department of Environmental Quality, looked at two separate aspects of graywater usage in the area: (1) the number of households currently using some portion of the graywater they generate and (2) the water quality of the residential graywater being generated and how that water quality affects the soil that is irrigated with that water.

• Researchers from the Alabama, Florida, and Georgia water resources research institutes came together to engaged in an 18-month interstate interdisciplinary research effort dealing with the allocation of water resources in both national and international settings. The findings have been used by the three State negotiating team to arrive at an equitable allocation formula for water shared in two basins.

• The Vermont Water and Resources and Lake Studies Center supporter, a researcher who has illustrated the use of least-cost optimization design to address the important problem of groundwater-pumping, induced salt-water intrusion in coastal aquifers. This has resulted in remediation designs which has resulted in remediation designs resulting in 20 percent lower cost than those generated by existing technology. Savings resulting from this work should be substantial in cases requiring groundwater remediation.

Thank you.

JOINT STATEMENT OF ASSOCIATION OF STATE DRINKING WATER ADMINISTRATORS (ASDWA), ASSOCIATION OF STATE AND INTERSTATE WATER POLLUTION CONTROL ADMINISTRATORS (ASIWPCA), AND COUNCIL OF INFRASTRUCTURE FINANCING AUTHORITIES (CIFA)

BACKGROUND

The Clean Water and Safe Drinking Water Acts established their respective State Revolving Fund (SRF) programs as the primary financing mechanisms for water quality programs. To meet the challenge of financing the Nation's clean and safe water needs, the States are committed to strengthening and enhancing the SRF funding mechanisms. U.S. EPA's Needs Assessment Surveys for infrastructure and other water quality enhancement efforts (e.g., non-point source, source water and watershed protection measures), support annual appropriation needs of at least $3

billion for the Clean Water Programs and over $7.5 billion to ensure the provision of safe drinking water. In addition, water pollution control and water purification technology research and development lag behind water programs' management needs.

State administrators agree that the State Revolving Loan Fund is the appropriate funding vehicle for the construction of drinking water and wastewater treatment and other water pollution control measures. The Clean Water and Drinking Water SRF programs have matured since their creation in 1987 and 1996, respectively, and the success of these unique programs has been clearly demonstrated. As of September 2001 the Clean Water SRF has provided nearly $34 billion—funding over 10,000 loans, while the Drinking Water SRF has provided $3.2 billion in loans for over 1,500 projects.

The SRF was created, in the first instance, to replace the Construction Grants program for municipal wastewater treatment facilities, with the goal of improving on the shortcomings of this grant-based funding approach. Congress, the Administration and the States were aware that the mechanism for providing grants to localities often: (1) was inefficient; (2) did not assure commitment to long term operations and maintenance; (3) was time consuming; (4) did not create a continuing revenue stream for future infrastructure needs; and (5) tended to inhibit timely compliance with State and Federal requirements.

In response, Congress, the Administration, and the States worked together, in 1986–1987, to create the Clean Water SRF to assure a funding source for municipalities in perpetuity. Based on its examination of both the loan and grant programs, Congress again chose in 1996 to establish an SRF program under the Safe Drinking Water Act as the principal mechanism for financing for both public-and privately owned water systems.

RECOMMENDATIONS

The three State organizations listed above support the passage of legislation addressing clean and safe drinking water infrastructure needs. Such legislation should provide additional funds to the SRFs for direct financing of pollution control measures, safe drinking water infrastructure and State implementation needs, and help support the necessary research and development to create the new control technology for the 21st century. States request that these funding commitments be made on a long-term basis for water and wastewater infrastructure, source water protection, non-point source, and other water protection and control mechanisms.

To manage these programs in the most efficient manner, ASDWA, ASIWPCA and CIFA agree that Congress should:

- Provide the States with the ability to tailor financial assistance to accommodate the needs of small and disadvantaged communities. Congress should include the ability to extend loan terms to 30 years and to forgive a portion of loan principal repayment under the Clean Water Act and should limit any necessary targeted funding to exceptional and or unique circumstances.
- Delegate hardship determinations to States based on State criteria such as affordability as measured by local fiscal capacity. This is important for local governments because with a SRF loan subsidy for the entire project cost, a community can realize the same financial benefit as they would receive under a partial grant, without having to borrow the grant match at high interest rates. The small and hardship communities will therefore benefit financially under the SRF.
- Enable State programs to provide financing assistance and allow States to direct SRF funds to the greatest area of drinking water and pollution control needs, including nonpoint source, source water protection, TMDL implementation, animal waste control, land purchases, other watershed management projects, transmission and distribution projects, treatment, and storage for water supplies.
- Allow States to transfer funds between Clean Water and Safe Drinking Water SRFs, in amounts and at times as that best suit the water infrastructure financing needs in their States.
- Allow the States to use, for administrative purposes, whichever is greater of the following: 4–6 percent of the total capitalization grant; $400,000 per year, or ½ of 1 percent of the current value of the SRF.
- Authorize the creation of a State-led forum comprised of the undersigned organizations, and representatives from the water and wastewater community and EPA to eliminate unnecessary and burdensome Federal requirements.

States support the strengthening of existing SRF programs because history has demonstrated that grant-based programs often:

- Undermine the existing SRF programs in each State because communities will seek grants rather than loans;

• Necessitate costly and wasteful duplication of administrative structures that are already available in the SRFs;
• Result in confusion and burdensome red-tape for local communities who would have to choose among more funding programs to accomplish the same infrastructure construction purposes;
• Waste financial resources that could otherwise be used to construct more facilities to benefit local communities and revolve in perpetuity;
• Undermine State compliance efforts as systems delay implementation until grants become available; and
• Inhibit State efforts to ensure long-term facility financial, managerial, and technical capacity.

SUMMARY

The undersigned organizations have worked together to develop a joint position because it has, over the years, become clear that: (1) the SRF is the appropriate mechanism for the design and construction of water and waster water treatment facilities; (2) the SRF can be enhanced to accommodate emerging needs of communities; and (3) the SRF needs to be funded at increased levels to accommodate the new requirements in the Clean Water and Drinking Water programs, as imposed by the Congress and the USEPA.

THE LOAN ARRANGER—GRANTS V. LOANS: WHAT'S THE BEST WAY TO MEET MICHIGAN'S WASTEWATER INFRASTRUCTURE NEEDS?

It has been said that competition brings out the best in people. When it comes to serving as a public official in municipal government, whether you are elected or appointed, competition for your time and energy is fierce!

Some issues compete for an even scarcer commodity—your community's money. I would venture to guess that for most of you, one of the toughest of those competitors, an issue that takes an inordinate amount of your time and effort, and stands to demand a significant monetary investment, is your community's wastewater system.

There are some good explanations why wastewater collection and treatment is garnering so much attention lately. The implementation of Michigan's Combined Sewer Overflow Control Program is well underway. Considerable efforts are also being expended to address sanitary sewer overflow problems. As these programs move forward, it is also becoming increasingly evident that huge amounts of money will be needed just to adequately maintain the extensive and aging wastewater infrastructure that exists in Michigan. All three of these demands are being felt against a backdrop of a heightened awareness of the importance of protecting Michigan's water resources and the public health of its citizens.

JUST HOW MUCH MONEY WILL HAVE TO BE INVESTED TO MEET THESE NEEDS?

The 1996 Federal Clean Water Needs Survey estimated Michigan communities would need to spend $4.9 billion over 20 years on their wastewater systems. *Managing the Cost of Clean Water: An Assessment of Michigan's Sewer Infrastructure Needs*, published in 2000 by Clean Water Michigan; estimates these costs between $2.7 billion and $5.8 billion: A report recently released by the Southeast Michigan Council of Governments (SEMCOG) estimates that over a 30-year period, needs in just the seven-county SEMCOG area will range between $5.7 billion and $10.1 billion to rehabilitate and upgrade existing wastewater systems. None of these estimates include the ongoing cost of basic operation and maintenance.

WHERE WILL THE MONEY COME FROM TO MEET THESE STAGGERING NEEDS?

Since 1989 local officials have usually sought financing for wastewater system improvements from the following sources:
• open market bonds which, like any borrowing, are backed by user fees, special assessments, and/or tax revenues;
• below-market-rate loan financing from the State Revolving Fund;
• grant and loan assistance from other Federal programs such as Rural Development; and
• special line-item appropriations from the Federal Government in the form of grants that nearly always require a substantial local match.

HOW CAN THE STATE AND FEDERAL GOVERNMENT BEST ASSIST LOCAL UNITS OF GOVERNMENT IN FINANCING WASTEWATER SYSTEM IMPROVEMENTS AND CONTINUE MICHIGAN'S IMPRESSIVE TREND OF IMPROVING WATER QUALITY?

That is the most important question. It is generally accepted that the most effective financial assistance program is one that maximizes the number of communities helped, and provides enough financial assistance to make local projects "affordable" to the ratepayers and citizens who will have to foot the bill.

State and Federal agencies have tried a number of wastewater financial assistance approaches over the years, and after careful consideration of the pros and cons of these, I strongly believe the State Revolving Fund option is superior to the grant approach. There are a number of reasons for this:

1. The SRF has more than 10 years of proven track record and is a well-established and functioning program. Any "new" grant program will require the creation of yet another level of bureaucratic structure/authority.

2. 1State Revolving Fund assistance is streamlined, with a minimum of Federal requirements. There is a real cost to the community to meet the various Federal crosscutting requirements that accompany any Federal grant.

3. SRF assistance is substantial, and makes a real difference in the cost of a project. Remember, a low-interest SRF loan is for the whole project, versus a grant, which funds only a portion of the project The balance of the grant-funded project must be financed at market rates. As a result, an SRF loan has a high "grant equivalency." For example, a 2 percent low-interest loan from the SRF, at a time when market rates are at 6 percent, is equivalent to a 30 percent grant.

4. The SRF dollar can be "stretched" to provide more assistance to more communities, sooner, than other assistance approaches such as grants. For example, in the last 13 years, Michigan has provided $1.5 billion in low-interest loans, from only $927 million in Federal and State match moneys.

5. The SRF does in fact "revolve," assuring continued financial assistance well into the future, unlike grant "funding mechanisms, which provide assistance only once.

6. The SRF can address affordability concerns by providing special, lower-interest loans to hardship communities. With ample program capitalization, Michigan could dramatically reduce the SRF interest rates for all communities.

7. The SRF provides critical flexibility to the States to ensure that specific State needs are addressed in the most efficient fashion.

WHERE DO WE GO FROM HERE?

Clearly, Federal and State financial assistance to communities to address wastewater infrastructure needs must increase if we are going to adequately address the water pollution and public health concerns of our communities. The key to successfully meeting communities' needs in Michigan, as well as in other States, is to champion a higher level of Federal capitalization of the SRF, with States assuring the accompanying match. Governor Engler has pledged to assure State match dollars will be available to meet every available Federal SRF dollar.

However,Federal funding has leveled off. From fiscal years 1998 through 2001, the annual Federal appropriation has been $1.35 billion: The last administration attempted to reduce that amount by $500 million in fiscal year 2001. I worked closely with Governor Engler and Michigan's congressional delegation to convince Congress to restore that $500 million and assure the full $1.3 billion was available to communities for wastewater needs.

Continued Federal funding of the SRF at this level would allow Michigan to award about $225 million/year in loan commitments. Unfortunately, the "demand" for SRF assistance far exceeds that amount. This gap will only continue to grow as our systems age and new collection/treatment challenges surface. Also, there is considerable discussion in Washington now to direct limited Federal funds toward grants instead of the SRF. If this occurs, even fewer needs will be met.

Although we have taken great strides in Michigan in recent years, the task of meeting our needs in the area of wastewater infrastructure remains a daunting one. Reauthorization of Title VI of the Clean Water Act would provide the needed budget focus for the SRF, and increased Federal appropriations would send the right message that our wastewater infrastructure and our Nation's water resources continue to be a national priority. A fully funded, robust SRF is essential if Michigan communities are going to be able to afford to make the critically needed improvements to our wastewater infrastructure. I look forward to working closely with members of the Michigan Municipal League in making this a reality.

FUNDED PROJECTS FOR FISCAL YEAR 2001

Another FiscaI Year has come to a close, with $255,615,000 awarded to ten wastewater projects from the State Revolving Fund (SRF), and $26,710,000 awarded to ten projects from the Drinking Water Revolving Fund (DWRF). To date, the SRF has assisted 184 projects with loans totaling $1.53 billion. In the DWRF to date, $158.9 million has been awarded to 62 projects.

Following are the communities receiving loans n Fiscal Year 2001, with a brief description o the project and the loan amounts:

SRF Projects:		
Intra Co. Drain. Board for Lake St. Clair, Macomb Co,.	Relief sewers, rehab, sewer separation, RTB upgrades, Segment 1A ..	$20,670,000
Lansing	CSO sewer separation, Subarea 013 South, Segment 13	10,860,000
Port Huron	Sewer separation, Segment 4	8,120,000
Bay City	Wastewater treatment plant and retention treatment basin upgrade	42,435,000
Three Oaks	Sewer replacement and rehab	2,155,000
Detroit	Connor Creek retention treatment basin (partial)	82,200,000
Port Huron	CSO sewer separation Item 34	640,000
Trenton	Replace sewers to correct SSOs, Segment 3	1,005,000
Monroe County, Carleton	Upgrade and expand the wastewater treatment plant (refinance)	5,330,000
George W. Kuhn Drain. Dist	12 Towns Retention/Treatment Basin Improvements, Segment 2	82,200,000
DWRF Projects:		
Chelsea	New production well, transmission main, softening treatment, Segment 1.	6,110,000
Lake Linden	New well, ground storage, replace mains	1,200,000
Sunfield	Elevated storage tank, looping, remove hydro tank, repair	880,000
Hudson	Replace pumps/motors, new iron removal facility	1,770,000
Milford	Filter media replacement, upgrade/replace storage tank, Phase 1	1,905,000
Sault Ste. Marie	Replace, mains, looping, Segment E (partial)	1,800,000
Flint	Upgrade and expand the water treatment plant, Segment 3	9,480,000
Blissfield	Install nitrate removal equipment	750,000
Muir	New wells, elevated storage tank, replace mains (partial)	1,850,000
Nashville	New and replacement mains, WTP improvements, standby generator	965,000

FISCAL YEAR 2002 FUNDS

We are still waiting for the Federal appropriation for the State Revolving Fund and Drinking Water Revolving Fund, before we can establish the Fiscal Year 2002 Fundable Range. As soon as we know how much money we will have available, we will post the information on our Section web site. The web address is *www.deq.state.mi.us/ead/mfsect/*

DAVIS BACON UPDATE

In the Winter 2001 edition of *The Loan Arranger*, notification was provided that the prevailing wage requirements of the Davis Bacon Act would be reimposed in the State Revolving Fund. The reimposition was to be implemented under provisions of a January 17, 2001 Settlement Agreement between the EPA and the Building and Construction Trades Department of the AFL–CIO.

It now appears that Davis Bacon requirements will NOT apply. We were informed in June that the EPA has reconsidered its decision and will not implement any terms of the settlement agreement. Although this may foster an extended legal battle between the EPA and th AFL–CIO, SRF recipients will not be required to pay prevailing wage rates. EPA's reversal is expected to be published in the Federal Register shortly.

THE TIME IS NOW TO PREPARE FOR A LOAN IN FISCAL YEAR 2003

The following Reverse Time Line is a valuable tool to show the basic sequencing of project plan preparation and provide a sense of the time needed to complete the process. The dates specified in the Time Line are flexible with the exception of the **Project Plan Submittal Date**, and are intended to assist you in the planning process.

	DWRF	SRF
The Project Plan must be received by the Environmental Assistance Division, Michigan Department of Environmental Quality:		
Project Plan Submittal Date	May 1	July 1
If the council meets on the first and third Thursdays of each month:		
Resolution of Project Plan Adoption	On or about April 15	On or about June 15
The final Project Plan must be available prior to the council meeting:		
Project Plan completed and available for public display	On or about April 14	On or about June 14
To allow at least 1 week to incorporate public comments:		
Public Hearing held on the draft Project Plan	On or about April 8	On or about June 8
To provide the mandatory 30-day notice for the Public Hearing:		
Public Hearing notice on the draft project plan is published	On or about March 9	on or about May 9
To provide at least 1 week for incorporating MDEQ comments on the draft Project Plan:		
Draft Project Plan is completed	On or about March 1	On or about May 1
To provide MDEQ staff with an opportunity to review and comment on the draft plan:		
Submit draft Project Plan to the MDEQ	On or about February 1	On or about April 1
Assume minimum[1] of 3 months to complete the draft Project Plan:		
Council authorizes the engineering work	On or about November 1	On or about January 1
To ensure you are on the right track and to facilitate approval of the Project Plan:		
Preplanning conference with the community/consultant and the MDEQ.	On or about October 1	On or about December 1
To initiate the Project Planning process:		
Council/Board decision to seek DWRF or SRF assistance	On or about September 15	On or about November 15

[1] The time necessary to complete a project plan varies greatly with the scope of the problem and size of the system being studied. Work may include research and some preliminary design; pilot testing; environmental agency contacts; analyses/evaluations; historical information; surveys; public involvement; rate structure development; mapping; etc.