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WESTERN WATER SUPPLY

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED EIGHTH CONGRESS

SECOND SESSION

TO RECEIVE TESTIMONY REGARDING WATER SUPPLY ISSUES IN THE ARID WEST

MARCH 9, 2004

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WESTERN WATER SUPPLY

TUESDAY, MARCH 9, 2004

U.S. SENATE,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The committee met, pursuant to notice, at 9:04 a.m., in room SD–366, Dirksen Senate Office Building, Hon. Pete V. Domenici, Chairman, presiding.

OPENING STATEMENT OF HON. PETE V. DOMENICI, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. The hearing will please come to order.

We will have a Senator to take my place in a little while when I have to attend another hearing.

First, I would like to take this opportunity to welcome the witnesses to this hearing relating to water supply issues in the arid West. We will discuss many issues today and I hope my colleagues will use this time to outline the pressing water issues they feel we must meet in their individual States, as well as in our country.

In my opinion, every State in the West, and for that matter, every State in the country faces the same problem. How do we supply adequate water, clean water, for our rural communities? How do we deal with the equally difficult problem of treating waste water, especially in rural small towns?

The U.S. Department of Agriculture and the Environmental Protection Agency both work to address these issues, but the need is astronomical, pervasive, and persistent. We can no longer put off our Federal responsibility in my opinion. While I do not feel it is appropriate to constantly invent new Federal programs, I am convinced that all agencies with responsibility to manage water resources must be engaged. There are two key elements.

First, we must make the technology and management methods work and be cost effective. We cannot expect to fix these problems solely based on today's methods and technology.

We must find a way to provide enough funding to bring clean, adequate water to these communities. One way would be to create a viable matching-funds program within the U.S. Bureau of Reclamation that partners the Federal Government and the States to assist rural communities across America.

Over the next few months, the Energy and Natural Resources Committee will address some of these Federal and State relationships. One of these partnerships that directly affects New Mexico is the Arizona water settlement, which includes the Gila River claims in New Mexico. We must move forward with these settle-

ments, but we must be prudent. I am particularly mindful that New Mexico receive its full allotment of water and receive the financial support it needs and deserves as we move this legislation forward.

If you have followed the headlines in any number of Western States, you have probably seen some similar to these: "Forecast Dire for Drought Relief," "Drought Not Letting Up on West's Farmers," "Western Power Plants Come Under Scrutiny as Demand and Drought Besiege Supplies," "Growth Drying Up Water Sources."

I do not even know where to begin to describe the vast challenges facing States like mine and surrounding ones, but I would like to take just a minute to point out a few that I believe highlight the issues.

We are entering the fifth consecutive year of a drought and forecasts call for less than average annual runoff in 2004. We anticipate the lack of runoff this year will exacerbate the already dire situation. One of the regions that will be hit the hardest in New Mexico is the Middle Rio Grande where for several years now we have been litigating over the allocation of already drought diminished supplies. This region has really struggled with the necessity of providing water to the largest city in the State, providing water for agricultural uses in the valley, providing water to six Indian pueblos, and finally providing an adequate supply for the endangered Rio Grande silvery minnow.

Nevada, Arizona, Texas, and California all face similar problems.

Water continues to be the backbone of the economy, and we all seem to be waiting, kind of walking in place, as the problems seem to be all around us. We just wonder what in the world we can do. In addition to protecting existing supplies and creating some new water sources, this means that we need to invest today in research for the advancement of the state of the art in desalinization, demineralization, water reuse, and purification technologies.

I have some additional comments. I am going to make them part of the record and proceed to ask the witnesses to address the committee and put their statements in and make them as brief as possible.

Panel one, the Honorable Bennett Raley, Assistant Secretary for Water and Science, Department of the Interior, would you proceed first? Thank you very much for all the hard work you do, and it is my pleasure to have you here today.

[The prepared statements of Senators Domenici, Allard, and Talent follow:]

PREPARED STATEMENT OF HON. PETE V. DOMENICI, U.S. SENATOR FROM NEW MEXICO

I would like to take the opportunity to welcome all of the witnesses to this hearing related to water supply issues in the arid West. We will discuss many issues today and I hope my colleagues will use this time to outline the pressing water issues they feel we must be met in their individual states as well as nationally.

It is my opinion that every state in the west, and for that matter, every state in this great nation faces the same desperate problems. How do we supply adequate clean water for our rural communities? And how do we deal with the equally difficult problem of treating waste water?

The U.S. Department of Agriculture and the Environmental Protection Agency both work to address these issues, but the need is astronomical, pervasive, and persistent. We can no longer put off our federal responsibility. While, I don't feel it is appropriate to constantly invent new federal programs, I am convinced that all

agencies with responsibility to manage water resources must be engaged. There are two key elements in solving these problems.

First, we must make the technology and management methods work and be cost effective. We cannot expect to fix these problems solely based on today's methods and technology.

Second, we must find a way to provide enough funding to bring clean adequate water to these communities. One way would be to create a viable matching funds program within the U.S. Bureau of Reclamation, that partners the Federal government and states to assist rural communities across America.

Over the next few months, the Energy and Natural Resources Committee will address some of these Federal-State partnerships issues. One of these partnerships, that directly affects New Mexico, is the Arizona water settlement which includes Gila River claims in New Mexico. We must move forward with these settlements, but we must be prudent. I am particularly mindful that New Mexico receive its full allotment of water and receive the financial support it needs and deserves as we move that legislation forward.

If you have followed the headlines in any number of western states, you have probably seen some similar to these: "Forecast Dire for Drought Relief", "Drought not letting up on West's Farmers", "Western power plants come under scrutiny as demand and drought besiege supplies", "Growth drying up water sources." These headlines highlight some of the areas continually plagued by drought in the West—the farming sector, the power industry, and of course our cities and towns.

I don't even know where to begin to describe the vast challenges facing New Mexico, but I would like to take a minute to point out a few which I believe best highlight the issues:

We are entering our fifth consecutive year of drought and forecasts call for less than average annual run off in 2004. We anticipate that the lack of runoff this year will exacerbate an already dire situation. One of the regions that will be hit the hardest in New Mexico is the Middle Rio Grande where for several years now we have been litigating over the allocation of already drought diminished supplies. This region has really struggled with the necessity of providing water to the largest city in the State, providing water for agricultural uses in the valley, providing water to 6 Pueblos, and finally providing an adequate supply for the endangered Rio Grande silvery minnow.

The pressure on the water supply in the Western United States has reached a critical point. Everyone is facing the prospect of declining water availability. For example, city planners in my home town of Albuquerque have speculated about the growth constraints facing the city due to limited groundwater resources.

Nevada, Arizona, Texas, and California all face similar problems. The Western United States is the fastest growing region in the country. This population explosion will undoubtedly result in a scarcity of fresh water sooner than many realize.

Water continues to be the backbone of our economy. Safe and adequate supplies of water are vital for agriculture, industry, recreation, and human consumption. In addition to protecting our existing water supply, we need to explore new ideas for expanding that supply and creating "new" sources of water. This means that we need to invest today in research for the advancement of state of the art in desalination, demineralization water reuse and other purification technologies.

The lack of a water supply isn't the real issue; it is the quality of the supplies surrounding us that is problematic. Brackish and sea water account for over 97% of the water on earth. There are brackish groundwater basins under many areas of the West, including New Mexico. Coastal states have the benefit of the Atlantic, Pacific and Gulf Coast on which to draw new supplies, but we need to take steps now and invest in the technology to utilize these supplies in a cost effective manner. Being able to cheaply covert this "new" supply into fresh water is vital to our future. Additionally, expanding our capabilities of reusing and conserving more water must also be thoroughly investigated. I know our committee is planning to explore many of these concepts later this month in our desalination hearing and I intend to do what I can to make significant advancements in these areas.

On the water quality, the Environmental Protection Agency is steadfast in enforcing a new standard for arsenic levels in drinking water that will burden many communities even though it rests upon questionable scientific underpinnings. In 2006, new EPA federal drinking water regulations will take effect. Although arsenic is a naturally occurring substance found throughout New Mexico, many of the state's small, rural communities, will be most affected by the new regulations and are the least able to pay for these new arsenic standards.

This arsenic issue is only one of the major hurdles facing rural communities today. The lack of a comprehensive Federal program able to assist these communities in providing safe, affordable and adequate supplies is another. There are cur-

rently two bills pending before this committee, one that I authored and one that Senator Bingaman introduced. We note that the Administration has provided a third version which they have asked me to introduce on their behalf. These bills create this much needed program. I intend to work with Senator Bingaman and the Administration in hopes of creating such a program. I note that we will also be having a hearing on the need for a rural water program later this month as well.

I have only touched on some of the issues affecting my state. As you all know access to fresh water is an increasingly critical national and international issue. As the world's population grows and our stores of fresh water are depleted, finding additional sources of fresh water will be key to ensuring our future and security both domestically and internationally.

I believe however, that we have a unique opportunity through new programs and new advances in technology to not only create new supplies, but also to provide the infrastructure to deliver these safe and affordable supplies to many in rural America and other parts of the country. I stand ready to assist in any way I can and I look forward to hearing what our witnesses have to say about these critical issues here today.

PREPARED STATEMENT OF HON. WAYNE ALLARD, U.S. SENATOR FROM COLORADO

MR. CHAIRMAN: As you know, the western United States continues to suffer through a sustained period of unprecedented drought. Large portions of my home state of Colorado are in the midst of a fourth year without adequate moisture. While state efforts to provide the appropriate relief continue, the federal government must act cooperatively with the states to bolster drought mitigation efforts where such federal involvement is appropriate. Appropriate action includes federal aid in dealing with invasive plant species—one of the largest culprits of water theft.

The expansion of a variety of invasive plant species known as phreatophytes threatens more than the natural plant mix and wildlife forage. Phreatophytes, including the Salt Cedar (or Tamarisk) consume vast amounts of water and degrade the natural environment. For example, the Tamarisk is known to consume more than 200 gallons of water a day and may lead to high salinity levels in rivers and soil. They also alter the natural course of the river through a root system that grows some 250 feet down into the ground. I commend your efforts to introduce legislation that creates new partnerships and funding to eradicate these invasive plants. Senator Campbell also deserves praise for his efforts as well. I am a strong supporter of the legislation and look forward to providing you with any assistance you should require. By working together, we can develop a common sense approach to tackling the water theft by invasive plant species and ultimately restoring the health of our riparian systems.

PREPARED STATEMENT OF HON. JAMES M. TALENT, U.S. SENATOR FROM MISSOURI

Mr. Chairman, thank you for holding this hearing. I think there are few issues as conflict-ridden as water issues. In the West and Northwest, you have no shortage of water conflicts. In Missouri, we have our share too.

For 14-years the Corps of Engineers has been working on the new Master Manual for the Missouri River. It was released earlier this month and we are now in the public comment period. I recognize the challenge that exists when trying to balance upstream and downstream interests but stakeholders in Missouri are very concerned with the recommendations in this plan.

In 1980, nearly 3M commercial tons moved on the Missouri River, in 1866, the Corps started tinkering with the Master Manual and we lost that reliable channel on the Missouri River. In 1990, we were down to 1.3M tons. Today, I submit for the record an article that ran in the St. Louis Post Dispatch on January 14 of this year*—"Two barge companies drop anchor." I'll read you the lead paragraph: "Uncertain about the depth of the Missouri River this summer, the two barge companies that move grain and fertilizer on the Big Muddy have shut down their operations."

I'll also take a moment to point out, 1997, the Tennessee Valley Authority stated that the competition of water transportation kept rail rates down to competitive levels and saved shippers $203M annually. I'm sure that number is still true today.

General Grisoli, can you tell me what your role was (personally) in the development of this plan?

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*The article has been retained in committee files.

The MM states (page VII-I) that "Congress did not assign a priority to these purposes [the eight congressionally authorized purposes of the river—flood control, navigation, irrigation, etc.] . . . The Missouri River Master Water Control Manual Review and Update Study (Master Manual Study) was conducted without bias toward any project purpose."

In June, 2003, the 8th Circuit Court released a ruling affirming the priorities of the Flood Control Act of 1944. The court stated, "The dominant functions of the Flood Control Act were to avoid flooding and to maintain downstream navigation" and recognized that "recreation and other interests [are] secondary uses" on the river.

How do you align the philosophy that Congress did not assign a priority with the 8th Circuit ruling that stated that "flood control and navigation" are dominant functions of the Flood Control Act of 1944?

The new Master Manual calls for a spring rise or "pulses" in the spring. While recently we've been in a drought situation, the floods of '93 and '95 were not that long ago. Those floods did major damage to farmland and urban areas of St. Louis and Kansas City. If we had additional, Corps imposed flooding, I can't imagine the devastation and outrage in the countryside.

Can you show me conclusive evidence that a spring rise called for in the Master Manual will actually improve the pallid sturgeon population? I can give you scientific data that implies that temperature, more than water depth is the spawning cue for the sturgeon. Additionally, the populations for the interior least tern and the piping plover have seen major improvements in recent years. So the only species you are working to improve here is the sturgeon.

Another issue that Missouri stakeholders have raised is that it appears the river will be operated by the Annual Operating Plan (AOP) rather than according to a long-term Master Manual (MM) rule. With that being the case, how can stakeholders expect any reliability when river operations are potentially subject to vast change on an annual basis and where there opportunity for input in the AOP process is limited and usually doesn't change the direction the Corps' plan is heading for the coming year?

Stakeholders were explicitly told by the Corps that "water banking" would not be a part of any new MM. A review of the MM indicates that the "water banking" scheme is indeed a part of the new manual. What is the reasoning for including a feature in the manual that was categorically guaranteed on numerous occasions would be eliminated after this year? FYI—"water banking" is detrimental to navigation as water used downstream is balanced against upstream uses creating "debits" to navigation that result in reduced season length.

STATEMENT OF BENNETT RALEY, ASSISTANT SECRETARY FOR WATER AND SCIENCE, DEPARTMENT OF THE INTERIOR

Mr. RALEY. Senator, it is always a pleasure to be before this committee.

Thank you for allowing my written statement to be added to the record. As is my custom, I will get right to the point.

If we look at this year as a snapshot from the Department of the Interior standpoint, focusing on the West, the drought is easing slightly West-wide, and we have some areas that were suffering deeply in 2001 and 2002 that will not suffer as badly. However, we still believe that there is a serious potential for challenges in the Middle Rio Grande in your home State of New Mexico, as well as in the Klamath Basin. Those are the two areas that we are most worried about if we focus on the short term.

As you mentioned, in the Colorado River basin, there like in the Middle Rio Grande we are in, depending on how you count it, the fifth year of a drought. The drought seems to be easing slightly, but we are still not up to normal runoff conditions. And as Commissioner Keyes testified some time ago, to understand the consequence of this deep and long drought, the best way to picture it is to understand that if we simply have nothing but normal conditions, it will take 15 to 20 years to refill the system.

The Colorado is blessed in the mainstem with storage capacity that is unmatched in any of the other Western rivers. I think those who came before us of both parties that had the wisdom to build that storage because, without it, the Colorado River basin States would be in deep trouble today.

With that, we have the flexibility to manage through more years of the drought, but as I come from a meeting of the seven States last Friday in Las Vegas, if the drought continues, there will be very serious issues on the mainstem, that will have to be faced by the Department and those States.

But the point that you make, Senator, is one that Secretary Norton would agree with most strongly, in that the issue is broad and pervasive. It is our belief that unlike the last century when water supply conflicts were either limited to times of drought or focused on fights over control of the resource for 20 to 50 years in the future, and those fights, as much as we in the West enjoyed them and hated them and wrestled through them, at the time of the last century were largely of local and regional importance.

The new paradigm for this century is that water supply issues are no longer going to be driven by droughts alone. We have a number of basins—and New Mexico is the classic example—where we have the potential for crisis in normal conditions. You know that well. Senator Bingaman knows that, and that is a challenge that will not go away with the next snowfall. That is the purpose of Water 2025, is to focus on the changing reality that it is no longer going to be a drought-driven debate. The water supply needs of the West, given the explosive population growth and the emergence of demands for endangered species and environmental restoration guarantee that, without action today, we will have crises in normal years.

Senator Bingaman, I was just mentioning that, unfortunately, the Department believes that New Mexico continues to be one of the areas we are most concerned about from a water supply standpoint. While the drought is easing somewhat in some of the other basins, this summer is going to be a challenge for all of us to work together, and we look forward to working with both of the Senators from New Mexico.

The second change in the paradigm from the last century, the first being that the conflicts were driven by drought and the impacts were limited to local and regional issues, is that we will first have normal year driven conflicts. The second is very clear, that water supply shortages in the next century will affect economies and resources of national and international importance. Water supply issues will no longer be an issue that is debated fiercely in the West. They have national importance. I need only point to the emergence of the dynamic of cities of Albuquerque, Phoenix, southern California, the rest of the West where there are nationally important economies to prove that water supply issues, if we fail to address them, will affect economies of national importance. California alone is the fifth largest economy in the world.

I need also point only to the Endangered Species Act, which is a national priority. We all know, painfully so, that water supply shortages have serious implications for attaining goals of the Endangered Species Act.

Simply put, the next century the water debate will change. We will have conflict, unless we do something now, in normal years, and that conflict will address and impact economies and resources of national importance.

Water 2025 is Secretary Norton's attempt to get to the reality that we do not have time for endless process. Process without progress is failure because it takes years to put in place the institutional and infrastructure answers to these supply issues, and we no longer have the luxury of debating it for decades to come.

With that, I will conclude my oral remarks and hope to engage with both Senators in questions.

[The prepared statement of Mr. Raley follows:]

PREPARED STATEMENT OF BENNETT RALEY, ASSISTANT SECRETARY, DEPARTMENT OF THE INTERIOR

Mr. Chairman and Members of the Committee, I am Bennett Raley, Assistant Secretary for Water and Science, Department of the Interior. I am pleased to be here today to testify on western water issues and the role the Department plays in managing and enhancing these important resources.

OVERVIEW OF WATER IN THE WEST

As I begin my testimony, I believe it would be helpful to first step back and examine the broad scope of issues related to water in the West. As we work to resolve the many individual water problems from the Federal perspective, we must remember to do so within the context of this broader picture, continuing to rely upon important guiding principles in the process. This Administration is committed to working hard on these issues at the local level as well as with the Congress, and in particular, the Members of this Committee. We must find sensible, affordable, and balanced solutions to the West's water problems in order to provide the certainty necessary for Western communities, industries, farms, and environment to all thrive. Almost all bureaus within Interior are involved with water issues, but my testimony today will center on the Bureau of Reclamation and the U.S. Geological Survey and their proud histories, recent accomplishments, and vision for the future.

In 1888 USGS began the process of gaging the rivers of the West when it developed the methods for streamgaging at Embudo, New Mexico. In fact, the staff at USGS who began this quantification of the resource became the Irrigation Survey, and in 1902, became the Bureau of Reclamation. And the Bureau of Reclamation was there, beginning in 1902 to build water projects in support of this effort to "reclaim" the arid lands of the West.

Reclamation began constructing projects that, at the time, were considered "impossible" to construct huge dams, hydroelectric generators, and vast networks of canals diverting water from rivers and streams to turn dry, nonproductive lands into the fertile and productive farms and ranches that continue to be the envy of the world. Reclamation dams created water supply reservoirs that allowed water to be managed. Floods were controlled and water was stored and released when needed, making electricity in the process. These facilities made irrigated agriculture possible in the West by creating a more stable supply of water that could be delivered during the prime growing season. They also provided a new source of water and power to cities and industries year round.

As the demand for water increased in these early years, so did conflict over its use, resulting in a system of water rights developed by the Western states to deal with these escalating water problems. The federal government recognizes the primacy of each state to establish its own system of water rights and regulations. And while the primary purpose of this regulation is to insure certainty and predictability in water management, conflict continues. A common element of this conflict across the West is that available water supplies are often inadequate to meet the demand for water for farming, cities, tribes, and the environment.

The good news is that we can look back over the years and see countless water conflicts, large and small, that have been resolved by people of good will. We know that conflict can be destructive to everyone's best interest and we have, over time, found innovative solutions to these complex challenges. Quantification and understanding of the resource have been and continue to be crucial to sound management. The USGS is responsible for this scientific process through its streamgages, observa-

tion wells, statistical analyses, and hydrologic models. They do this in cooperation with 607 State, local, and Tribal agencies in the Reclamation States.

Reclamation projects continue to provide the important water supplies critical to the traditional water uses for which they were originally designed and built. However, the West has become the fastest growing area of the country. Environmental demands for water have also increased over the past several decades. Restoration of rivers and streams to support habitat for species of fish and wildlife listed as endangered or threatened by Federal laws have created even more pressure on the West's already stretched water resources. Compounding the demand picture is the current protracted period of drought conditions across the inter-mountain west that we are currently in.

CURRENT HYDROLOGIC CONDITIONS

In comparing precipitation this year to the same time last year, we see substantial improvement in many areas of the West which bodes well for the upcoming water year. The dark red areas in the following Drought Monitor and USGS monthly average streamflow illustrations* represents the worst conditions where drought is predicted to be most severe. As you can see, they are more dispersed and localized this season than last year. We continue to see improvement in snowpack and rainfall, even in areas where we predict shortages. In much of the West, streamflows are currently averaging near normal. The exceptions are the Great Basin, Upper and Lower Colorado, and the Rio Grande regions, where the multiyear run of below normal flows persists. Over the past month, the lowest streamflows have been observed by the USGS in the Great Salt Lake, North Platte, Salt, Upper Canadian, and Upper Cimarron basins. Overall, although it is too early to accurately predict drought conditions, we are encouraged by recent precipitation and are monitoring all areas of the West for drought conditions on a regular basis.

To further illustrate, the following are the relatively current conditions in the major basins of the Western United States:

Mid-Pacific Region (Northern CA, Southern OR, Northern NV). Central Valley Project reservoir storage levels remain above the 15-year average. Accumulative inflows for the water year to date range from 112 percent in the Trinity Basin, 106 percent in the Shasta Basin, to 66 percent in the American Basin, 70 percent in the Stanislaus Basin, and 76 percent in the Upper San Joaquin Basin.

Great Plains Region (CO, MT, WY, ND, SD, NE, KS, OK & TX). Temperatures are slightly above normal for this time of the year with precipitation below normal. Reclamation reservoirs are at extremely low levels, and inflows have been at record low levels. Available storage in Reclamation facilities in NE and KS, as well as at several locations in MT and WY has reached minimum levels.

Upper Colorado Region (NM, UT, Western CO, Southern WY). The Upper Colorado Region is heading into its fifth consecutive dry year. Following a promising start, snowpack levels are generally declining in UT and CO, and are improving from a very poor start in NM. Reservoir storage is low from four prior years of drought, and precipitation is generally below average for most areas so far this year. A series of heavy storms is needed to replenish the snowpacks before spring, when parched soils will likely absorb much of the runoff.

Pacific Northwest Region (ID, OR, WA, Western WY & Western MT) February precipitation was near normal in most of Oregon and Idaho, but has lagged behind in the Yakima (WA), Flathead (MT), and Upper Snake (ID/WY) basins. As a whole, Oregon snowpacks are in the 125% of normal range, which promises relief for the Crooked, Malheur, Powder, and Owyhee basins where it is needed most. Despite this, new runoff forecasts should remain near to slightly below normal in most of the Region due to dry soil conditions.

Lower Colorado Region (Southern NV, AZ, Southern CA). The Lower Colorado region has been experiencing significant precipitation in recent weeks. While that will do little to mitigate the Colorado River drought, the same storms are also providing precipitation in the southern portion of the Rocky Mountains which could increase runoff volumes.

How much longer will this drought persist? How much worse might it get? Although these questions cannot be answered simply or with certainty, we know that multiyear droughts in the United States are frequently associated with long-term shifts in Pacific and Atlantic Ocean temperatures. Recent research by the USGS indicates that much of the long-term predictability of drought frequency may reside in the multidecadal behavior of the North Atlantic Ocean. Should the current warm conditions in the North Atlantic persist into the coming decade, it is possible that

*All illustrations have been retained in committee files.

drought conditions resembling the continental-scale patterns of the 1930s and the 1950s are possible.

EFFECTS OF MULTIPLE YEARS OF DROUGHT

The western U.S. has seen several large swings in climate during the past century. These swings are defined by dry spells during 1898-1904, 1946-1972, and wet periods during 1905-1924 and 1976-1998. Since 1999, the southwestern U.S., the southern and central Rockies and the western Great Plains have been gripped by persistent drought, particularly in 2002. Water year 2002 (October 2001-October 2002) was the driest of the last century in Arizona (45% of the normal from 1895-2002) and second driest for the Southwest (AZ, NM, CO, UT). Still, the four-year average from 1999-2002 (77.8% of normal) was not as dry as 1953-1956 (76.6%) or 1901-1904 (71.9%). Regardless of ranking, the ongoing drought has produced remarkable phenomena on the southwestern landscape, creating conditions that contributed to a half-a-million-acre fire on the Mogollon Rim to more than a million acres of pinyon and ponderosa tree dieoffs in Arizona and New Mexico. In the Colorado River Basin, the four years from 2000 to 2003 rival the years 1953 through 1956, which were previously the driest four years in the Basin. If we have another similar dry year in 2004, we will surpass the driest five years in the 100-years of historic records have been kept in the Basin. While precipitation in the Basin so far this year is near normal, the dry soil conditions will reduce actual runoff to a current projection of 76% of average. In spite of the drought, the Colorado River reservoir system is still 53% full and will allow limited surplus water deliveries in the lower Basin this year.

The Klamath Basin has been a central focus for water issues in the West during the past few years. In 2001 because of extremely dry conditions and the requirements of an Endangered Species Act (ESA) Biological Opinion and Tribal trust responsibilities, the Klamath farmers were unable to receive water for agriculture for the first time in 96 years. Later season releases of 75,000 acre-feet of water were insufficient to mitigate the impacts to many of the farms and the 5 Klamath wildlife refuges in the Basin. In short, the Klamath Basin suffers from too much demand for water. Drought conditions exacerbate the situation with the only remedy being to reduce that demand.

The Middle Rio Grande has been under drought conditions since 1996, and the Rio Grande Compact storage restrictions, engaged in 2002, continue to greatly impact storage capability for farmers. Heron, El Vado, and Elephant Butte reservoirs averaged 83 percent capacity in 1999. Today, the three reservoirs average about 15 percent capacity. The Six Middle Rio Grande Pueblos, Middle Rio Grande Conservancy District, Elephant Butte Irrigation District, El Paso Water Improvement District #1, and Mexico all received full water supplies in 1999. Today, the Six Middle Rio Grande Pueblos are on a strict rotation schedule. The Middle Rio Grange Conservancy District is also on a strict rotation schedule and anticipates non-Indian farmers being able to irrigate through mid-July. The other water Districts are projected to receive a 59 percent supply.

WATER 2025: PREVENTING CRISIS AND CONFLICT IN THE WEST

Secretary of the Interior Gale Norton has made Water 2025 a key focus for the Department of the Interior because water truly is the "lifeblood" of the American West. Water 2025 is based on the reality that the economic, social, and environmental health of the West is important to the people of this nation. Water 2025 is also based on the reality that the demands for water in many basins of the West exceed the available supply even in normal years.

These realities, when combined with the fact that the West is home to some of the fastest growing communities in the nation, guarantee that water supply-related crises will become more frequent if we do not take action now. Unlike the past century, when water crises were intense, but typically occurred in drought years and only affected resources and economies of local and regional importance, water supply-related crises in this century will affect economies and resources of national and international importance unless we take action now.

Water 2025 has been "road-tested" with 3000 people attending one of ten meetings throughout the West. The bottom line is that, while there was a significant debate over what should or should not be added to Water 2025, almost all participants endorsed Water 2025 as an approach that will unite, not divide, very divergent interests.

Our "hot spots map" shows where we believe the next crises and conflict over water exist, and identifies the areas where we should concentrate our resources.

The red areas are where conflict potential over water is highly likely; orange areas where conflict potential is substantial; and yellow areas where conflict potential is moderate. Reclamation will periodically update these designations and use it to help prioritize areas of the West where Water 2025 could be implemented to prevent conflict and crises.

With the support of Congress in the FY 2004 Budget, Secretary Norton has moved forward with Water 2025 with the announcement of the Secretary's Water 2025 Challenge Grants. These grants will be made throughout the West in the summer of 2004 on a cost-share basis for projects that make real progress towards avoiding water crises in the West.

> "I have initiated what I call the Four C's as the cornerstone of my tenure: Consultation, Communication, and Cooperation, all in the service of Conservation. At the heart of the Four C's is the belief that for conservation to be successful, the government must involve the people who live and work on the land."—Gale A. Norton, Secretary of the Interior.

WATER 2025: PREVENTING CRISIS AND CONFLICT IN THE WEST

Water 2025 is based on realities that will shape, if not control, policy level water supply decisions over the next 25 years.

WATER 2025 REALITIES

1. Explosive Population growth is occurring in some of the driest areas of the West. Likewise, there is a substantial demand for water to attain the goals of the Endangered Species Act or environmental restoration programs in some of these arid regions.
2. Over the next 25 years, the demand for water for people, tribes, farms, and the environment will exceed the available supply in many basins in the West.
3. If we are to meet the demand for additional water supplies in the future, existing water supply facilities must be maintained and modernized so they will continue to provide the water and power that is a part of the existing inventory. Otherwise, we will be moving backwards instead of forwards.
4. Unlike the last century, water supply crises in the next 25 years in the West will not be drought-driven and limited to local and regional impacts. Unless we act now, water supply crises will occur in normal years and affect economies and resources of national and international significance.
5. Most solutions to water supply crises, regardless of whether they are institutional in nature or include new or additional infrastructure, take years, if not decades to implement. Endless process, without actual progress towards implementing solutions that work, simply guarantees that there will be fewer options to deal with the inevitable crises.
6. In some areas, the development of alternative water supplies such as brackish and seawater desalinization can reduce the pressure on surface water supplies.
7. There is no broad support for extremist positions on water policy that would destroy irrigated agriculture, ignore tribal water needs, prevent economic growth and development, or fail to protect the environment. The question then becomes one of how to provide for the shift of water between competing uses. At a conceptual level the debate is between the use of governmental authority to redefine rights or reallocate the use of water, or the use of market-based mechanisms to meet unmet or emerging needs.

Water 2025 is based on principles that must be recognized if we are to minimize or avoid water supply related crises.

WATER 2025 PRINCIPLES

1. Solutions must be based on and recognize interstate compacts and United States Supreme Court decrees that allocate water among states, water rights established under state and federal law, tribal water rights, and contracts for the use of water.
2. The implementation of water monitoring, measuring, conservation and management technologies will provide some of the most cost-effective gains in our ability to meet the demand for water in the future.
3. The attainment of economic, social, and environmental goals relating to water supply requires long-term stability that is more likely to be provided by collaborative solutions than by litigation.

4. Market-based tools that rely on willing buyer willing seller transactions are far more likely to provide stability and avoid conflict than are regulatory or litigation-based alternatives for meeting unmet and emerging needs for water.

Water 2025 proposes not rhetoric, but pragmatic, reality-based tools that have been tested in the crucible of the real world.

WATER 2025 TOOLS

1. Water conservation and efficiency. The increased use of simple tools like water measurement structures, automated control structures, and computer-based system monitoring can allow water users to either stretch their water supplies further or make part of their supplies available on a willing seller-willing buyer basis for otherwise unmet demands.

2. Markets. Explosive population growth and the emergence of the demand for water for environmental restoration and attainment of the goals of the Endangered Species Act will typically define the extent and severity of water supply-related conflicts. The experience of the Klamath basin in 2001 provides an example of the consequences of an attempt to use regulatory mechanisms to reallocate water from existing uses to emerging needs. The value of market-based approaches as an alternative is proven by the success of CalFed, the new Klamath water bank, the operation of the Central Valley Project in California, the ag-to-urban transfers in Southern California, and the 50 year-old water market in Northern Colorado.

3. Collaboration. When it comes to water, people, farms, and the environment all need certainty in order to plan for and meet long-term objectives. Endless litigation rarely, if ever, achieves this goal. In particular, long-term or multi-year Biological Opinions under the Endangered Species Act provide the predictability that is necessary in order to make the rational decisions and investments that are required to provide water for people, water for farms, and water for the environment.

4. Technology. In some areas, demands on limited surface water supplies can be reduced through the development of alternative water supplies. A range of alternative water supply technologies exist, including desalinization, advanced water treatment and reuse, and water recycling. Interior will seek to facilitate the implementation of desalination and advanced water treatment through improved interagency coordination of research and focused investment to areas most needing planning support.

5. System Optimization. While it is clear that in some regions it will be necessary to develop new surface water supplies and infrastructure, the fiscal, legal, and political hurdles to the development of significant new supplies make it imperative that existing water supply infrastructure be fully utilized within the framework of existing treaties, interstate compacts, water rights, and contracts.

FY 2004

As a first step in implementing Water 2025, Secretary Norton has announced the creation of a Challenge Grant Program. The request for proposals is now available on the Water 2025 website (*www.doi.gov/water2025*). We have identified for this program $4.0 million of the $8.4 million appropriated in Fiscal Year 2004 for the Western Water Initiative. The Western Water Initiative is the first step toward Water 2025. This program targets irrigation and water districts in the West who are willing to leverage their money and resources with the Federal government on projects that make more efficient and effective use of existing water supplies through water conservation, efficiency and water markets.

Projects will be selected through a competitive process that focuses on achieving the outcomes identified in Water 2025, specifically conservation, efficiency, and water marketing.. We will accept proposals until April 8 of this year and award the grants by July, with implementation commencing around the first of August.

A grant program on water treatment is also underway in FY 2004. Wastewater, salty and other impaired water can be purified to increase their utility. Water 2025's goal is to significantly aid technological advances and identify new supplies. Reclamation can facilitate research to reduce the high costs that slow adoption of new water treatment technologies, such as desalination technologies. Proposals that demonstrate ways to help avoid crises and conflict over water supplies in the West will be selected through the current competitive process in the Reclamation Science and Technology Program.

The Bureau of Reclamation is also collaborating with the Middle Rio Grande Conservancy District [$1.750 million] to identify water conservation efficiency improvements projects, such as flow measurement devices, data collection and water man-

agement stations, diversion dam rehabilitation, and other tools identified in Water 2025.

Rounding out the FY 2004 Western Water Initiative funding provided by the Congress, the Bureau of Reclamation is working closely with Ohio View Consortium [$1.0 million] and Desert Research Institute [$1.0 million] to match their capabilities with the need for new technology to address future water supply problems in the West.

FY 2005

In keeping with the spirit of Secretary Norton's 4C's—Cooperation, Communication and Consultation in the service of Conservation, Interior agencies, in conjunction with the Department of Agriculture, plan to closely monitor the western basins experiencing drought conditions. We will also continue to coordinate existing programs with other federal agencies, such as the Corps of Engineers and Natural Resources Conservation Service.

Other activities highlighted in the FY 2005 budget request that are designed to address the water problems in the West are as follows:

Klamath Project in Oregon and California ($25.0 million). This funding would provide for on-the-ground initiatives to improve water supplies to meet agricultural, tribal, wildlife refuge, and environmental needs in the Klamath Basin and to improve fish passage and habitat. This is part of a $67.2 million Department of the Interior request spread across several bureaus, focused on making immediate on-the-ground impacts. The Department, in consultation with the Klamath River Basin Federal Working Group, is developing a long-term resolution to conflict in the Basin that will provide water to farmers and tribes while protecting and enhancing the health of fish populations, and meeting other water needs, such as those of the adjacent National Wildlife Refuge.

Middle Rio Grande ($18.0 million). This request continues funding in support of the Endangered Species Collaborative Program. In addition, the request continues funding for acquiring supplemental water, channel maintenance, and pursuing government-to-government consultations with Pueblos and Tribes. Finally, the funding would continue efforts that support the protection and contribute to the recovery of the Rio Grande silvery minnow and southwestern willow flycatcher.

Animas-La Plata in Colorado and New Mexico ($52.0 million). This request includes $52.0 million for the continued construction of Ridges Basin Dam and Durango Pumping Plant and pre-construction activities for Navajo Nation Municipal Pipeline, Ridges Basin Inlet Conduit, utility relocations, and project support activities.

Columbia-Snake River Salmon Recovery in Idaho, Oregon, Montana, and Washington ($17.5 million) addresses the implementation of Reasonable and Prudent Alternatives (RPAs) included in two Biological Opinions issued in December 2000. The FY 2005 funding would address significantly increased regional coordination, off-site mitigation activities in selected sub-basins to offset hydrosystem impacts, and continue research, monitoring and evaluation efforts.

Rural Water ($67.5 million). The funding request for rural water projects emphasizes a commitment to completing ongoing municipal, rural, and industrial systems. Funding is included for Mni Wiconi, Mid-Dakota, Garrison, Lewis and Clark and Perkins County projects. Funding required for Mid-Dakota is sufficient to complete the project. I am pleased to announce that the Department's Rural Water supply program legislative proposal was sent to Congress on March 3. The program established under this proposed legislation will allow Reclamation, the Department, and the Administration to provide a much needed and demanded service to the American people in the Reclamation States, while exercising the type of project oversight and development that has been lacking in some of the individually authorized projects we have seen in the past.

Hydropower Direct Financing ($30.0 million). The FY 2005 budget proposes to finance the costs of operation and maintenance of certain Reclamation hydropower facilities directly from receipts collected by the Western Area Power Administration from the sale of electricity.

Safety of Dams ($64.0 million). The safety and reliability of Reclamation dams is one of Reclamation's highest priorities. Approximately 50 percent of Reclamation's dams were built between 1900 and 1950, and 90 percent of those dams were built before the advent of current state-of-the-art foundation treatment, and before filter techniques were incorporated in embankment dams to control seepage.

Central Valley Project Restoration Fund ($54.7 million) this request includes funds for the CVP Restoration Fund and is expected to be offset by discretionary receipts totaling $46.4 million collected from project beneficiaries under provisions

of Section 3407(d) of the Act. These funds will be used for habitat restoration, improvement and acquisition, and other fish and wildlife restoration activities in the Central Valley Project area of California. The requested level and the amount of offsets are determined by formulas contained in the 1992 authorizing legislation.

California Bay-Delta Restoration. ($15.0 million) The funds would be used consistent with a commitment to find long-term solutions in improving water quality; habitat and ecological functions; and water supply reliability; while reducing the risk of catastrophic breaching of Delta levees.

In addition to these activities in Reclamation's FY 2005 budget, the USGS is proposing two new budget initiatives related to Water 2025. The first is a $1 million water availability and use initiative focusing on water data and information needed to help communities address critical and increasingly complex water-availability issues. This initiative proposes work over a 5 year period, based on the USGS Future Science Directions and the USGS Report to Congress, Concepts for National Assessment of Water Availability and Use. The second is a $2.8 million initiative focused on improving the understanding of two endangered sucker species in Upper Klamath Lake and how their survival is affected by changes in water quality, natural climatic cycles, lake-level management, and habitat for spawning and rearing.

The FY 2005 budget for the USGS Water Program proposes $202.7 million to continue water resources work. This includes an increase of $1.4 million for research into the water quality in the Klamath Basin. In addition, $1 million is proposed for implementation of a new five-year initiative concerned with water availability and use as part of Water 2025.

In FY 2005, the USGS will focus research on the Klamath River basin in southern Oregon and northern California, where water supply is currently inadequate to meet demands for irrigating 250,000 acres of farmland, sustaining habitat in several critical wildlife refuges, and maintaining in-stream flows and lake levels in order to protect three threatened and endangered fish species. In the Klamath Basin, where water is in extremely short supply, it is particularly important that seasonal runoff forecasts are very accurate. In this regard, USGS is working closely with the Natural Resources Conservation Service and the Bureau of Reclamation, to improve seasonal flow forecasts by incorporating ground-water conditions into the forecast model. The FY 2005 budget requests $1.4 million dedicated to improving the quality and quantity of water entering Agency and Upper Klamath Lakes, to model hydrodynamics and heat transport in the Lakes, and to monitor nutrient loadings and algal ecology. An additional $1.4 million is requested for biological studies to focus on the ecology of two endangered sucker species in Upper Klamath Lake, Oregon. This information will improve the forecasts of resource-management decisions being made by Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and Klamath Tribes. The total USGS FY 2005 request for Klamath studies is $3.7 million, a $2.8 million increase over 2004.

The total Administration request for Klamath is $105 million, including $67.2 million contributed by Interior Bureaus.

In related studies with California's North Coast Regional Water Quality Control Board, the USGS has documented the data needs for water-quality models of the Klamath River between Upper Klamath Lake and the Pacific Ocean. The models would be used to develop the total maximum daily load (TMDLs) for temperature, nutrients, and dissolved oxygen, the role of natural and anthropogenic source loadings for temperature, dissolved oxygen, and nutrients. A key consideration is protection of fall-run salmon, including the endangered Coho, in the Lower Klamath River.

There is a heightened need for using science and technology to understand and manage our Nation's water resources. The USGS and Reclamation will build upon their partnership on the Watershed and River System Management Program. This program has already resulted in models that improve the efficiency of water system operations. The USGS provides the science related to atmospheric and watershed processes, while the Reclamation provides the engineering expertise related to river, reservoir and irrigation management. This partnership has resulted in a coupling of USGS watershed models with Reclamation operations models.

The FY 2005 budget requests I just highlighted demonstrate the Department's commitment in meeting the water and power needs of the West in a fiscally responsible manner.

Finally, I would like to end my testimony by sharing with the Committee some of our accomplishments in addressing the water supply problems in the West.

On October 16th, 2003, Secretary Norton celebrated the signing of the historic Colorado River Water Delivery Agreement with representatives of all of the Colorado River basin states, the San Diego County Water Authority, Imperial Irrigation District, the Metropolitan Water District of Southern California, and the Coachella

Valley Water District. This Agreement marked the resolution of a 75 year old dispute over the allocation of California's share of the Colorado River. California has agreed to take specific, incremental steps that will reduce its over-reliance on the Colorado River water in the next 14 years, allowing the state to live within its authorized annual share of 4.4 million acre-feet. The agreement allows the six other Colorado River Basin States to protect their ability to use their Colorado River allocations to meet future needs.

In the lower Colorado River Basin, despite the fourth consecutive year of substantial drought on the Colorado River in 2003, Reclamation delivered Arizona, California and Nevada their full basic annual apportionment of river water. The United States' obligation to deliver 1.5 million acre-feet of Colorado River water to Mexico was also met. Since the completion of Hoover Dam in 1935, Reclamation has delivered to each of these states and to Mexico, at a minimum, their basic annual apportionment of Colorado River water, despite several periodic and severe droughts.

Many projects, such as the Central Valley Project (CVP) in California, are operated to address different demands simultaneously. For example, in 2003, the CVP made available about 7,200,000 acre-feet of water for agriculture, 540,000 acre-feet for municipal and industrial water users, 400,000 acre-feet for wildlife refuges, and 800,000 acre-feet to protect and restore the San Francisco Bay-Delta fishery, as required by the Central Valley Project Improvement Act.

The Department negotiated two agreements (Conservation Water Agreement and the Emergency Drought Water Agreement) with the State of New Mexico and other entities, and acquired about 90,000 acre feet of water from willing contractors to provide supplemental water flows for the endangered Rio Grande silvery minnow.

Interior agencies work with other Federal agencies, and State, and local governments, partners, and stakeholders, to determine innovative ways to address unmet demands.

- In 2003, Reclamation rented storage water and natural flows from willing irrigation districts and individuals in the Snake, Boise, Payette, Lemhi and John Day Basins of Idaho and Oregon. This resulted in a win-win situation irrigators received economic support in return for the water they provided to enhance river flows for endangered salmon.
- Reclamation developed streamflow simulation models and water quality simulation models for the Weber River System in the Ogden, Utah area, and the Ashley and Brush Creeks which are tributary to the Green and Colorado Rivers. These models work together to enable water managers to simulate and analyze proposed water management scenarios to better meet existing water demands and meet future increased demands.

Reclamation is also exploring ways to enhance the current water supply.

- With cost-sharing from the Colorado River Basin States, Reclamation has expended $45 million on salinity control projects during 2001-2003. The cost effectiveness of these projects has improved dramatically to about $30/year/ton of salt controlled. This is nearly a three-fold reduction in cost per ton of salt removed compared to earlier projects at $80 per ton. It is estimated that these projects will control nearly 500,000 tons/year of salt from reaching the Colorado River.
- Working with the State of Utah, local governments, and water districts, Reclamation has reduced the total phosphorus loading into Deer Creek Reservoir by more than 50 percent. The largest source of drinking water to the Wasatch Front from the Provo River was very contaminated and Deer Creek Reservoir was dominated by toxin, taste, and odor producing blue green algae. The 1994 completion of Jordanelle Dam provided an opportunity to clean up some of the problems. For the past 2 years, even with major drought and water shortages, Deer Creek Reservoir has provided the cleanest water to the Wasatch Front since it was constructed.
- Throughout 2003, the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and Bureau of Indian Affairs, under the direction of the Department of the Interior, helped balance the needs of water users and endangered species that depend on the Rio Grande for their survival. The two endangered species are the Rio Grande silvery minnow and the Southwestern willow flycatcher. Efforts to preserve and protect the species occurred in the following areas: water acquisition and management, habitat restoration, listed species population management, fish passage, and water quality improvement.
- In 2003, Reclamation, the U.S. Fish and Wildlife Service and Bureau of Indian Affairs continued participation in the Middle Rio Grande Endangered Species Act Collaborative Program, and cooperation on ESA, National Environmental Policy Act and other environmental compliance requirements. These agencies

continued government-to-government consultations with the pueblos and tribes living in the Rio Grande Basin.

- Reclamation and Collaborative Program participants are restoring the Rio Grande to a wider, shallower channel with a sandy bottom, and removing invasive plant species from the bosque and replacing them with cottonwoods and willows to benefit the endangered species. Seven projects covering 415 acres have been completed, and an additional seven projects covering 413 acres will soon be under way. Four pueblos are participating in these restoration efforts.
- Reclamation has supported activities aimed at increasing the population of the silvery minnow including: developing a master plan for management, increasing the numbers of silvery minnow through captive breeding and rearing (propagation) and re-introducing (augmentation) silvery minnows into the Rio Grande, monitoring silvery minnow populations in the wild, and rescuing fish from dry river reaches and moving them to other parts of the river when appropriate.
- Reclamation, the Army Corps of Engineers, and the Bonneville Power Administration submitted their first "check-in" report to NOAA Fisheries on October 1, 2003, as required by the Federal Columbia River Power System Biological Opinion of 2000. The three agencies stated that the overall implementation of the Biological Opinion (BO) is on track and that the status of the Columbia River basin salmon and steelhead listed under the Endangered Species Act is improved over the conditions prior to the BO three years ago. The 2003 Check-In Report acknowledges that good ocean conditions are a major contributor to the good returns, but improved fish passage at Columbia and Snake River dams and better habitat, hatchery and harvest practices are also contributing. Reclamation's primary contribution to this success has been working with private landowners to remove or modify in-stream barriers to migrating fish, such as temporary gravel diversion dams.
- Reclamation completed the A Canal fish screen on the Klamath Project in southern Oregon. The fish screen facility is a key requirement of the U.S. Fish and Wildlife Service's Biological Opinion to recover endangered Shortnose and Lost River Suckers in Upper Klamath Lake. During a typical irrigation season, the A Canal transports nearly 250,000 acre-feet of irrigation water used on Klamath Project farms. Without these fish screens, water deliveries could have been susceptible to cutbacks to prevent fish losses.
- A reserve of water was made available for release down the Trinity River during the summer of 2003 in case it was needed to prevent a reoccurrence of conditions that led to fish mortalities in the Klamath River the previous year.
- The Department, the States of Nebraska, Wyoming, and Colorado, along with Nebraska water users, continue to work on a Cooperative Recovery Program for Platte River endangered species. The Department funded a review by the National Academy of Sciences (NAS) of the science and conclusions which underpin the need for a recovery program for the four threatened and endangered species that use the Platte River. An expedited schedule of review by NAS was negotiated so it will not delay a Record of Decision on the Platte EIS by the end of calendar year 2004.
- On May 19, 2003, the U.S. Supreme Court approved the Kansas v. Nebraska settlement which was filed with the Special Master December 16, 2002. While Reclamation was not a party to the suit, it was assigned by the court as amicus curiae (friend of the court) and was a full partner in helping successfully negotiate the settlement.
- Reclamation signed a Memorandum of Understanding with the San Diego River Park Foundation and the City of San Diego for Phase I of the San Diego River Restoration Project. This project, to which Reclamation is contributing $500,000, will upgrade natural riparian habitat, improve water quality and enhance recreational opportunities along the river. It also may enhance groundwater quality and improve water quality for downstream recreational users and others.
- Reclamation began the Los Angeles Basin County Watershed Study, which will help determine the practicability of recharging urban stormwater runoff; develop a stakeholder-supported strategy to identify locations for projects to recharge water throughout the basin; develop tools that will help decision-makers determine where, when and how to recharge urban runoff; and develop cost-sharing agreements among agencies benefiting from the project.
- Reclamation and Fish and Wildlife Service formulated a plan for river management on the Pecos, resulting in a non-jeopardy opinion for the threatened Pecos bluntnose shiner.
- A fish passage was constructed in the Public Service Company of New Mexico diversion dam on the San Juan River. The passage re-linked critical habitat in the upper San Juan River basin. The passage was an immediate success: endan-

gered fish and other native fish species began using the facility within the first month of operation. This effort was made possible through the cooperation of the Navajo Nation, Public Service Company of New Mexico, and the San Juan River Recovery Implementation Program.

Reclamation continues to work with partners through habitat joint ventures conducted under programs such as the North American Waterfowl Management Plan including:

- Working with the Yakama Nation to restore wetlands on the Yakama Reservation;
- Partnering with Ducks Unlimited, the Washington State Department of Fish and Wildlife, and the Intermountain West Joint Venture to create and enhance wetlands along the Winchester Wasteway in the Columbia Basin;
- and Participating in a joint venture with the U.S. Fish and Wildlife Service and Ducks Unlimited to create a brood marsh at the Hansen Waterfowl Management Area as part of the Prairie Potholes Joint Venture in North Dakota.

Aquatic invasive species clog canals and waterways, causing widespread water delivery problems. Salt Cedar (Tamarisk) is a particularly harmful invasive plant. In 2003, Reclamation started an aggressive salt cedar control program, the largest and most successful eradication program in New Mexico, along the Pecos River. The Department is also co-sponsoring a Tamarisk Workshop in Albuquerque, NM later this month. Senator Domenici, Senator Campbell, Senator Bingaman and other members of the Senate are to be commended for their legislative efforts to address this problem.

Reclamation continues to work under the Reclamation States Drought Relief Act of 1991 to respond to drought conditions in Western States. During FY 2003, Reclamation:

- Allowed storage of non-project water in Reclamation facilities.
- Provided emergency assistance for Indian and non-Indian domestic water supplies in Montana, New Mexico and Arizona.
- Purchased water for endangered species requirements under the Endangered Species Act, thus allowing deliveries to continue to contractors.

Reclamation operates and maintains 58 hydroelectric powerplants that provide about 10 percent of the electric power in the Western United States. Reclamation plants generate nearly $1 billion in power revenues annually and lead the hydropower industry with low costs and high reliability.

Many of Reclamation's projects are home to recreation opportunities. Visitors to Reclamation lakes and facilities contribute about $6 billion a year to local and regional economies and provide some 27,000 non-Federal jobs. Reclamation continues to work with other Federal land management agencies, state, county, and local partners to develop, manage and cost-share recreation projects.

The Department also contributes to resolution of drought and water supply issues in the west through the scientific work of the USGS. Examples of this include the recently completed Middle Rio Grande ground water study, the southwest ground water initiative (which has significantly advanced capabilities to estimate ground water recharge), improved real-time coverage of surface-water and ground-water conditions (through Waterwatch and Groundwater Watch), the recently completed study of the impact of irrigation in the Methow Valley of Washington, new hydrologic and river systems models of the Yakima basin in conjunction with the Bureau of Reclamation, and scientific leadership of the upper San Pedro River partnership in southern Arizona.

Thank you for the opportunity to address the Committee today. I will be happy to answer any questions that you may have.

The CHAIRMAN. Thank you very much.

Senator Bingaman, did you want to comment?

Senator BINGAMAN. Mr. Chairman, since I am late, let me just put my opening statement in the record, and we will go ahead and I will just ask questions when the opportunity arises.

[The prepared statement of Senator Bingaman follows:]

PREPARED STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

Good morning. I want to Join in welcoming the witnesses to today's hearing on the important topic of water supply in the arid West. We all know that the West has been faced with a severe, multi-year drought. I understand that the focus of this

hearing is status and trends in water use and needs in the West. It is crucial that we ensure that there will be water supplies available in the future for our communities, for our ranches and farms, and for the environment.

I would like to register a note of concern this morning. The Administration is widely touting its "Water 2025" initiative—and it's my view that the initiative, at least in concept, is worthy of support. The Secretary has conducted a series of well-publicized meetings throughout the West, seeking input of stakeholders on future needs in an effort to avoid future crises. I certainly endorse these collaborative efforts.

Unfortunately, while the Administration proposes an $11.6 million increase in Water 2025 for the Bureau of Reclamation, it is also proposing over $25 million in cuts from other Reclamation programsthat support conservation, efficiency, collaboration, and technology initiatives. On top of that, the budget proposes a 64 percent cut for Title16 water reclamation and reuse projects, despite the endorsement of water reuse in Water 2025. These cuts represent a lack of meaningful commitment to address the West's water issues, and in my view render Water 2025 an exercise in form over substance.

Moreover, cuts in Reclamation's budget could have serious repercussions in New Mexico. Drought and competing demands for water, including endangered species needs, have resulted in water use in the Middle Rio Grande basin degenerating into an annual rite of crisis management. Addressing this situation requires compliance with a Fish & Wildlife Service 10-year biological opinion that Interior estimates will cost $230 million. Yet Reclamation's 2005 budget reduces funding for ESA compliance activities by $9.5 million from FY 2004 levels. At the requested FY2005 level of $5.9 million, we can expect to satisfy the biological opinion in no less than 30 years. The Secretary recently issued a press release stating that "[t]he issues in the Middle Rio Grande Basin have been a priority since the beginning of my tenure as Secretary. . . ." My only response is that actions speak louder than words.

I would also like to focus on the issue of groundwater depletion in the West—and in particular, the depletion of the groundwater resources of the High Plains Aquifer which underlies eight states, including a portion of eastern New Mexico. This aquifer provides water for irrigation and also for drinking water supplies for several communities in my State. It is being depleted at an alarming rate. For example, areas of the aquifer in New Mexico and Texas had from 50 to 175 feet of water-level decline from 1950 to 1980, and more than 60 feet of water-level decline from 1980 to 1999.

Last Congress, I was pleased that the Farm Bill included an initiative to provide funding for an incentive program to encourage the use of more efficient irrigation equipment and less water-intensive cropping patterns. This year, the Senate has passed legislation introduced by Senators Brownback, Domenici and myself, to provide enhanced mapping, characterization and modeling with respect to the groundwater resources of the High Plains Aquifer. I hope that we will see this legislation enacted into public law.

Mr. Chairman, thank you for conducting this hearing. I also want to state my appreciation for your willingness to include a representative of the Western States and the Tribes at today's hearing. I look forward to the witnesses' testimony.

The CHAIRMAN. Senator Bingaman, one of the thoughts that I expressed prior to your arrival was that if you look out in our State and some of the adjoining States that we get to see, one of the biggest shortages is the lack of any basic resource for small, rural towns and their water needs and sewage needs. Things are just literally falling apart. These towns have to grow. They are growing. They do not have any money. There are no revolving funds, and I just wonder when we are finally going to come around to doing that.

I myself keep reading that the Government wants to, but everything I see is too minuscule for the size of the problem. I might solicit your help in putting together a major effort and just see what happens to it, where we ask the Federal Government to put more than a few billion dollars in a revolving fund so that the States and localities can draw on it. You and I could spend 15 minutes and tick off 25 little communities in our State that there is no way they are going to get anywhere because they do not have any money and

nobody has any money to give them and we have no program. And without water, they are in pretty bad shape.

Mr. Secretary, thanks for your comments. Now, let us just move back this way and we will talk to Brigadier General Grisoli, Commander of the Northwestern Division, U.S. Army Corps of Engineers. General.

STATEMENT OF BRIGADIER GENERAL WILLIAM. T. GRISOLI, COMMANDER, NORTHWESTERN DIVISION, U.S. ARMY CORPS OF ENGINEERS

General GRISOLI. Good morning, Mr. Chairman. Good morning, Senator Bingaman.

Senator BINGAMAN. Good morning.

General GRISOLI. It is an honor for me today to testify before you on behalf of the Corps of Engineers on the matter of water supply in the Western States.

The committee has asked the Corps to address four issues regarding drought in the Western States: first, the drought conditions in the Western States over the last 4 or 5 years and projections used by the Corps to prepare for future operations; second, how the data may change predictions for the potential of floods and water flows; third, the drought's impact on navigation and flood control and other reservoir water management responsibilities in the Western States; and finally, activities to alleviate drought impacts on water supply and other Corps responsibilities.

The Western States have been in drought since 2000, and the Southwestern part of the Nation has been in continual drought for the past few decades.

Although the Corps' primary mission at reservoir projects is flood control, the Corps, to the extent permissible under our project authorities, attempts to manage the projects in a manner which protects water supplies and the environment.

The continuing drought has caused reservoir levels throughout the region to be severely depleted. This has negatively impacted all project purposes except for flood control, which is positively impacted because of the increased capability to store flood waters.

The management of the water stored in all Corps reservoir projects is guided by the congressionally authorized purposes set out for each project and the requirements of other legislation such as the Endangered Species Act. The Endangered Species Act requires Federal agencies ensure that their actions are not likely to jeopardize the continued existence of any federally listed threatened or endangered species or result in the destruction or adverse modification of their critical habitat.

While the Corps does not attempt to make long-term drought forecasts, we develop annual reservoir control plans based on models that predict stream flow and reservoir levels and work with other State and Federal agencies to evaluate conditions. The Corps collaborates with meteorological experts at the National Oceanic and Atmospheric Administration to make use of the most updated research and use that information to help operate our reservoir projects.

To help make decisions about reservoir storage and releases for multi-purpose projects and environmental needs in the Columbia

Basin, the Corps relies on the Northwest River Forecast Center to prepare water supply and streamflow forecasts. The Northwest River Forecast Center is part of the National Weather Service.

The Corps also relies upon the Rocky Mountain North snowpack data collected by the Natural Resource Conservation Service to facilitate runoff forecasts in the Missouri River basin.

In the Colorado River basin, the Corps is a part of a multi-agency team called the Colorado River Forecast Service Technical Committee. This committee of technical experts shares technological advances and expertise to track and evaluate conditions on the Colorado River.

On the Rio Grande, a joint agency water operations model has been developed and implemented to manage water supply, flood control, and environmental purposes. The Corps is working very closely with the Bureau of Reclamation to use this model to develop annual operating plans that reflect forecasts for reservoirs and river operations.

Many of the reservoirs in the California Central Valley are multi-purpose with the varied owners and operators. During flood operations the Corps has the responsibility for managing the water stored in a designated flood control space. The U.S. Bureau of Reclamation and private owners, on the other hand, are responsible for allocating the water reserved for municipal and irrigation purposes and stored below the flood control pool. The Corps, with cooperation from our partners, uses our latest hydrologic and reservoir simulation computer modeling to evaluate water management decisions pertaining to flood control and environmental issues.

Lastly in southern California, in addition to managing for our multi-purpose needs, daily reservoir operations are designated to also provide for groundwater recharge.

Now, as you have heard today, drought throughout the Western States place extreme challenges on the Corps' ability to meet all the congressionally authorized purposes and comply with the Endangered Species Act. To address drought conditions, the Corps includes contingencies for drought in our water management plans that seek to balance these competing requirements.

In addition, the Corps, in collaboration with our partners, monitors and alleviates other impacts of drought to the community within our existing authority. Throughout the western region, we partner with Federal, State, and local agencies and stakeholders to maximize project operation for water supply and other purposes.

Mr. Chairman, thank you for providing me the opportunity to provide you this initial statement. I am prepared to now answer your questions.

[The prepared statement of General Grisoli follows:]

PREPARED STATEMENT OF BG WILLIAM T. GRISOLI, COMMANDER, NORTHWESTERN DIVISION, U.S. ARMY CORPS OF ENGINEERS

INTRODUCTION

Mr. Chairman, subcommittee members, and distinguished guests, I am Brigadier General William T. Grisoli, the Commander of the Northwestern Division of the U.S. Army Corps of Engineers (Corps). I am honored to be here today to testify on the matter of Water Supply in the Western United States.

You asked that we address four issues regarding drought in the Western United States: first, the drought conditions in the Western United States over the last 4-

5 years and projections used by the Corps to prepare for future operations; second, how these data may change predictions or the potential of floods and water flows; third, the impact on navigation and flood control and other responsibilities (reservoir water management) of the drought and related issues in the Western United States; and, finally, activities to alleviate drought impacts on water supply and other Corps responsibilities. The following provides more specific information related to these four issues for each of the following river basins in the Western United States: the Colorado, Rio Grande, Sacramento, and San Joaquin River basins, and the watersheds associated with the Colorado Aqueduct of the Metropolitan Water District of Southern California and the Los Angeles Aqueducts of the City of LA Department of Water and Power, in the South Pacific Division of the Corps and the Columbia and Missouri River basins in the Northwestern Division of the Corps.

The management of the water stored in all Corps reservoir projects is guided by the Congressionally authorized purposes set out for each project and the requirements of other legislation such as the Endangered Species Act (ESA). The ESA requires that Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of any Federally listed threatened or endangered species, or result in the destruction or adverse modification of their critical habitat.

SOUTH PACIFIC DIVISION BASINS

The arid west is the fastest growing region in the United States. The coastal rivers are home to threatened and/or endangered fisheries that require a certain level of flow to sustain them. This coupled with the demands for water by the agricultural industry that presents us all with a great challenge. The southwestern part of the nation has experienced drought for much of the past few decades.

Although the Corps primary mission at our reservoir projects is flood control, the Corps, to the extent permissible under our project authorities, attempts to manage these projects in a manner that protects water supplies. We sometimes perform this balancing act in a non-traditional way by holding back water after rainstorms or snowmelts, and releasing it at a slow enough rate such that it seeps it into the ground for use later in the year when it may be more valuable.

Colorado River Basin

In the Colorado River basin the Corps is involved in partnerships with other Federal water resource agencies. For example, the Corps is part of a multi-agency team called the Colorado River Forecast Service Technical Committee. Other Federal agencies on that committee include the Natural Resource Conservation Service (NRCS), the United State Geological Survey (USGS), the National Weather Service (NWS), the Western Area Power Administration of the Department of Energy (WAPA), and the upper and lower Colorado basins regions of the United States Bureau of Reclamation (USBR). This committee of technical experts shares technological advances and expertise to track and evaluate conditions on the Colorado River to balance the national interests of water supply, energy needs, environmental interests, and flood control.

The Corps is also teaming with meteorological experts at the National Oceanic and Atmospheric Administration (NOAA) to make use of the most updated research, to relate to them our technical needs, and to use that information to help our sponsors study new ways to operate our reservoir projects that can help reduce the impacts of water shortage.

Rio Grande River Basin

The Rio Grande basin in Colorado and New Mexico is generally considered to be in the midst of a long-term drought. This region experienced extreme drought conditions during 2002 and 2003 causing reservoir storage levels to be severely depleted. The snowmelt runoff forecasts for 2004 are much brighter with runoff forecasts in the range of 70 to 100 percent of average. This runoff combined with water stored under the Emergency Drought Water Agreement will assure sufficient water to meet the 2003 Biological Opinion flow requirements to sustain the endangered Rio Grande silvery minnow. The multi-agency agreement is part of a 3-year deviation agreed upon to provide water for the endangered minnow.

The Corps is actively involved in the comprehensive water management and related planning activities, where we have multi-purpose reservoirs. On the Rio Grande, a joint-agency water-operations model, the "Upper Rio Grande Water Operations Model" or "URGWOM" has been developed and implemented to help guide multi-agency operational decision-making. This tool is used to support studies related to water accounting and annual operating plans for the Rio Grande from the Colorado/New Mexico border to El Paso, Texas. The Corps is working very closely

with the USBR to develop an Annual Operating Plan, using URGWOM, which reflects forecasted reservoir and river operations. We are also working with the New Mexico Interstate Stream Commission, the U.S. Fish and Wildlife Service (USFWS), the Middle Rio Grande Conservancy District, the Middle Rio Grande Pueblos, and other stakeholders to provide the most efficient water management possible. URGWOM is also providing the capability to analyze 40-years of key flow and storage projections as we examine numerous alternatives within existing authorities for optimal future water management. The results of this study will be presented in the "Upper Rio Grande Water Operations (URGWOPS) Environmental Impact Statement (EIS)".

The Albuquerque District of the Corps is a joint lead agency in both of these efforts, providing the funding and human resources to complete them, along with providing the model development site and the center of activities. The modeling brings together the operational knowledge and the respective interests of the agencies, to allow detailed examinations of the effects of varying operations. It allows the collaborating agencies to coordinate their water management during drought conditions, and regulate the various projects to preserve listed endangered species such as the Rio Grande Silvery Minnow, while supplying water to meet existing public needs. URGWOM is a very important technical tool that will significantly contribute to our understanding of the effects of water management decisions and improve our capability to respond to the needs of the various stakeholders in the desert southwest. It is a great example of effective partnering that will allow the Corps to provide the best possible public service.

Sacramento and San Joaquin River Basins

In California's Central Valley the water contained in the reservoirs under the jurisdiction of the Corps is generally managed, but is not allocated by the Corps. Specifically, during flood control operations the Corps has the responsibility for managing the waters contained in the designated flood control space. At many Corps projects in the Western United States, the USBR is responsible for allocating water reserved for irrigation purposes and contained below the flood control pool.

The Corps typically determines the appropriate flood control volume required for each project. This volume is established during the planning and design of each project before a project is approved by Congress for construction.

In concert with operations for flood control, certain flood control projects are also operated for other project purposes including environmental considerations. For instance, releases from flood control storage are made at certain ramping rates, are designed to allow operation of these projects for flood control while ameliorating particular environmental concerns such as those associated with endangered species.

The Sacramento and San Joaquin River basins Comprehensive Study (Comp Study) included the development of a hydrologic computer model to facilitate the water management decision-making process. The Comp Study evaluated a large number of operational alternatives for several flood control projects utilizing this model, which was developed specifically for the study. The simulation model was developed using the Corps' HEC-5 reservoir simulation computer software. These analyses investigated the change in flood control benefits associated with potential changes in particular operational criteria for either a single reservoir, or combinations of reservoirs. These analyses were intended solely to evaluate flood control operations in the Central Valley and provide "what-if" scenarios pertaining to flood control, not water supply.

There have also been computer simulations completed to investigate the benefits of conjunctive-use technologies and additional off-stream storage to further reduce the impacts of flooding in certain locations.

Current conditions provide some hope for this year. A series of heavy winter storms 2 weeks ago improved the Sierra Nevada Mountain snow depths to above normal levels, with a month remaining to improve on that snowpack. Snow depths in the northern Sierra's from Mount Shasta to the Feather River was at 141 percent of normal, with around 3 feet of water equivalent. The central Sierra's, from the Yuba River and Lake Tahoe basin to the Merced River, was at 112 percent of normal, and from the San Joaquin River south the snowpack was at 108 percent of normal. Across the entire range the depth was 127 percent of average, an increase from last month's measurement of 115 percent. More than a third of the state's drinking and irrigation water comes from Sierra runoff from snowpack, which also powers hydroelectric plants that produce about a quarter of California's power.

Colorado Aqueduct Of The Metropolitan Water District Of Southern California and The Los Angeles Aqueducts Of The City of Los Angeles Department of Water and Power

In southern California daily reservoir operations are designed to provide groundwater recharge through the use of buffer pools. This saves water districts tens of millions of dollars annually ($12 million per year at Whittier Narrows Dam alone), and is an important supplement to water imported via the USBR's Central Valley Project, the State Department of Water Resource's State Water Project, the Colorado Aqueduct of Metropolitan Water District of Southern California, and the Los Angeles Aqueducts of the City of Los Angeles Department of Water and Power. Also, in the Central Valley, daily reservoir operations are keyed to forecasted water needs, snowpack, and runoff forecasts to improve benefits derived from those reservoirs. Planning studies are also underway to increase seasonal water storage at our 'dry' flood control basins and wet reservoirs, and re-operation studies are underway to investigate increasing water stored for multipurpose needs. These studies will need to take into account competing needs for the available water uses.

Research by NOAA into more accurate and advanced quantitative precipitation forecasts (QPFs) may further allow maximization of project operation for water supply. The Corps has partnered with NOAA's Environmental Technology Laboratory, the Nevada Desert Research Institute, and the Corps' Hydrologic Engineering Center, in sharing information on that research.

NORTHWESTERN DIVISION BASINS

Columbia River Basin

The Federal Columbia River Power System (FCRPS) in the Columbia River basin is a very large and extremely complex system designed to meet multiple uses for a multitude of stakeholders. Operational decisions are not only designed to meet the many authorized project uses and other statutory and regulatory requirements, but are also influenced by and have to accommodate changes in weather and water supply.

Most of the annual precipitation of the Columbia River basin is concentrated in the winter months with the bulk of the precipitation falling in mountainous areas as snow stored in deep snowpack awaiting the warmth of spring for its release. As a result, winter streamflows are generally low with high, sustained runoff flows occurring in the spring and early summer. This Columbia River runoff pattern exemplifies a major seasonal variation of flow with about 60 percent of the natural runoff of the Columbia occurring during the months of May, June, and July. The Columbia has an average annual runoff at the mouth of about 198 million acre-fee (MAF) making it second only to the Missouri-Mississippi River System in the United States in average annual runoff.

A long-range strategy for the operation of storage reservoirs must be developed up to six months in advance in order to provide for the multiple purpose uses of the Columbia River. Embedded within long-range operational strategies, water managers must respond to changes and deviations within the operational period. Short duration rain events, flood events, warm weather, or snowmelt within any sub-basin of the Columbia River requires water managers to adjust the overall operational strategy throughout the system. These short duration events may only last for a week or less, yet they are significant and require constant coordination and cooperation among state and federal agencies to best determine how these short duration events may affect the overall ability to meet the long range operational strategy and multiple purpose uses of the FCRPS. These events are significant enough that real-time adaptive management to meet fish needs under the current Biological Opinion occurs at least every other Wednesday on a formal basis and often occur on an informal basis each Wednesday to respond to changing conditions.

The FCRPS operates as a system with some limited flexibility at individual storage reservoirs to meet immediate needs downstream of that reservoir. As a system there is a general annual cycle of operation and strategy for setting priorities.

By August 31 most federal reservoirs are drafted somewhat below full to augment flow for Federally listed threatened and endangered fish species. Since September through December is generally a dry period with limited inflow to the reservoirs, they do not fill significantly from their summer levels. By November, the USBR's Grand Coulee Dam begins to release water to meet downstream flow at the Corps Bonneville Dam to maintain sufficient water in spawning areas for the Federally listed chum salmon. In January, the Northwest River Forecast Center develops the region's first water supply forecast. This is the first official glimpse into the future and whether the spring season will be a drought or a season of high flow. From January through April 10, the reservoirs operate to refill to flood control draft limits.

The object of this strategy is to have the federal reservoirs as full as possible to begin releasing water in spring for flow augmentation for Federally listed fish species in the Snake and Columbia Rivers. The federal reservoirs then operate to fill by June 30, while augmenting flow for downstream fish needs, and not causing flooding. In July and August the federal reservoirs draft to specific elevations to augment flow for listed fall Chinook salmon. Although no two water years are alike, the current National Marine Fisheries Service (NMFS or NOAA Fisheries) Biological Opinion acknowledges and has a plan for accommodating changing seasonal strategies. The 2000 BiOp is a key element in the long-range operational strategy for the Columbia River basin.

The current Biological Opinion (BiOp) provides guidance for the long-range strategy and basic framework to operate and fine-tune the complex Columbia River basin system. The BiOp provides guidance to benefit fish migration, and acknowledges the need to meet other interdependent objectives. The BiOp considers meeting regional and local flood control needs, as well as regional power needs. The BiOp offers a forum to gather information and provide the real-time adaptive management needed to respond to ever changing water conditions. Development of the existing BiOp required the concerted effort of numerous biologists, water managers, and power marketers and took many years to develop.

The Technical Management Team (TMT) is the regional technical forum that was developed under the NMFS BiOp to monitor water and fish conditions and provide the adaptive management mechanism for operation. The TMT has been meeting since 1996 to provide federal project operators with recommendations for operations to best meet the needs of fish. The TMT provides a process to develop consensus recommendations and reconcile disparate scientific views.

The first official water supply forecast is made in January each year. This is the region's first indication that a drought may affect operational needs in that year. Since the reservoirs had been drafted the previous year for flow augmentation for fish, a drought condition does not offer enough inflow to reservoirs so they can refill to April 10 flood control elevations per the 2000 Biological Opinion and provide augmentation water for fish in the spring. During drought years, flow from April 10 through the end of June will likely be insufficient to fully satisfy all needs, i.e. meet flow objectives for Federally listed fish species, and refill reservoirs, and meet other needs in the basin, such as power generation. If reservoirs are unable to refill by the end of June, there will be limited water for flow augmentation in July and August as the federal reservoirs draft for summer flow augmentation for listed fish.

In the Columbia River basin, 2001 was the most recent year of drought-like low water supply. The Corps is responsible for the operation of reservoirs in the Columbia River to meet the congressionally authorized multiple purposes of the dams. To make decisions about reservoir storage and releases, the Corps relies on the Northwest River Forecast Center to prepare water supply forecasts, and streamflow forecasts. The Northwest River Forecast Center is a part of the National Weather Service. The projections prepared by the Northwest River Forecast Center are used to plan future operations. The expected water supply (runoff) is predicted for the basin using estimated snowpack in the Rocky Mountains, and the snowpack does not begin to build significantly until December. The Northwest River Forecast Center does not begin forecasting water supply until January. There are long-term tools being developed by some agencies to allow predictions earlier than January, or to predict water supply several years into the future, however, they have not yet been accepted as reliable enough to guide reservoir operations. Reservoir operations in the Columbia River basin are planned on an annual basis. A relatively small amount of storage is available in the Columbia basin reservoirs compared to the annual water supply. There is approximately 40 million acre-fee (MAF) of reservoir storage as compared to the average annual runoff of 198 MAF (measured at the mouth of the Columbia). About one half of the storage in the basin is in Canada and is operated by British Columbia Hydro and Power Authority (BC Hydro). In the United States, the USBR and the Corps combined operate about half of the storage, with each agency operating around a quarter of the total basin storage. There are several private operators, but the quantity of storage they manage is very small. Because of the small amount of storage available compared to water supply, reservoir management is not planned on a multi-year basis. Storage reservoirs are planned to operate to fill in summer. When water is plentiful this allows reservoirs to release water in winter to generate power, and to fill in spring and capture floodwaters. When water is more limited operations address multiple needs as established in project authorizations and under the Endangered Species Act.

The water supply forecasts prepared by the Northwest River Forecast Center are updated every month from January through June. The Corps uses the updated water supply forecasts to determine the required flood control draft at storage res-

ervoirs throughout the Columbia River basin and assures flood control drafts are met. The Corps oversees all the reservoirs in the basin, whether they are operated by private or federal agencies, which includes the Canadian reservoirs. Each month from January through April, when the water supply forecast is updated, and the resultant flood control drafts at reservoirs change, the reservoirs operations and resultant water releases are managed adaptively to meet future needs. In addition to using the water supply forecasts, at lease once each week the Northwest River Forecast Center prepares expected streamflow predictions for the Columbia River basin. The Corps uses these streamflow predictions to analyze flood potential during the spring snowmelt season and the system's ability to meet the multiple purposes uses of the dams. In years of drought, flood risk because of rapid snowmelt is minimal. Rain events that occur during May and June when reservoirs are nearly full may cause floods in drought years.

The Corps managed the navigation channel from the mouth of the Columbia River inland 453 miles to Lewiston, Idaho. In 2001, to conserve water, recreational navigation lockages were limited to only a few times each day. The Corps was prepared, as part of its drought contingency planning, to transport potable water to meet public health and welfare needs. The Corps participated in the Interim National Drought Council Meeting in June. Regional coordination at technical levels through the executive level was ongoing to assure the multiple purpose uses of the resource were met. The agencies most heavily involved were the Corps, the USBR, the Bonneville Power Administration, NOAA Fisheries, the US Fish and Wildlife, and representatives from the States of Oregon, Washington, Idaho, and Montana and Columbia basin Tribes. Technical and executive level coordination and cooperation had been in place prior to the drought and continues through the present. Regular coordination meetings will continue into the future under the National Marine Fisheries Service Biological Opinion.

Missouri River Basin

In contrast to the Columbia basin, the Missouri River basin has a tremendous amount of storage capacity compared to average annual runoff because of the existence of the largest system of reservoirs in the United States. The Missouri River Mainstem Reservoir System (System) is comprised of six large dams and reservoirs with a total storage capacity of 73.4 million acre-feet (MAF). Average annual runoff into the System is around 25 MAF. The six System dams stretch along the main stem of the Missouri River from Montana through North and South Dakota. The System was designed specifically to support the Congressionally authorized project purposes of flood control, navigation, hydropower, irrigation, water supply, water quality, recreation, and fish and wildlife under varying runoff conditions, including an extended drought like that experienced in the 1930's. Around 39 MAF of System storage is identified to for use during extended droughts.

Construction of the System dams occurred from the 1930's through the mid-1960's. The highest dam in the System, Fort Peck, was constructed in the 1930's as a Work Progress Administration project. The 1944 Flood Control Act, commonly referred to as the Pick-Sloan Act, authorized the remaining five dams. The entire System first filled to operating levels in 1967.

The Corps has also constructed numerous other projects on the Lower River downstream from the System, including the Missouri River Bank Stabilization and Navigation Project (BSNP) from Sioux City, Iowa, to St. Louis, Missouri. The navigation and bank stabilization projects were authorized under various Congressional acts. The navigation channel in the Lower Missouri River was first authorized as a 6 foot channel from Kansas City, Missouri, to the mouth of the river in the Rivers and Harbors Act of 1912. Several subsequent acts modified the navigation project. The latest modification, the Rivers and Harbors Act of March 1945, authorized construction of a 9-foot-deep by 300-foot-wide channel from Sioux City to the mouth. The release of water from the System serves the navigation purpose by providing water to the navigation channel at navigation target flow rates. The Flood Control Acts of 1941, 1946, 1948, 1963, 1968, 1974, and 1978 authorized additional bank stabilization projects. Further streambank erosion controls were authorized under the Water Resources Development Acts of 1974, 1986, and 1988.

Since the System first filled in 1967, there have been two moderate to severe droughts in the Missouri River basin; one from 1987 until the flood of 1993, and the current drought that began in the year 2000. As the Missouri River basin enters its 5th year of drought (6th in Montana), the impact on the System becomes increasingly severe. The upper three reservoirs behind Fort Peck, Garrison, and Oahe Dams, which contain 88 percent of the total storage, are drawn down 23 to 30 feet, and last month the System as a whole reached an all time record low since it first filled in 1967. This has negatively impacted all project purposes except for flood con-

trol, which is positively impacted because of increased capability to store floodwaters.

Examples of the negative impacts include lack of access for recreational craft at the upper three System reservoirs due to low reservoir pool levels (boat ramps out of water). Also, shortened navigation season lengths and lower releases to conserve stored water have negatively impacted navigation on the Missouri River from Sioux City, Iowa to the mouth at St. Louis. Lower releases have also negatively impacted hydropower production at the six System dams, and caused concern, and in a few cases, reduced power generation at thermal powerplants that use Missouri River water for once-through cooling. Water supply intakes have also been affected, most notably in the current drought a USBR intake for the Standing Rock Sioux Tribe at Fort Yates and a municipal intake at the Town of Parshall, both in North Dakota. Irrigation has also been negatively impacted due to difficulties accessing the System reservoir pools due to their low levels.

The Corps has taken several steps to alleviate the negative impacts due to the drought. For recreational interests, the Corps has extended boat ramps at the upper three System reservoirs. We have completed emergency work at the Parshall, North Dakota intake that will ensure continued operation through this year. The USBR has implemented measures that have returned the Fort Yates intake to service. The Corps provided technical assistance to users to assist them in their planning for mitigation of drought impacts.

The Corps does not attempt to predict multi-year droughts on the Missouri, but does track snowpack in the Rocky Mountains each winter season to facilitate runoff forecasts for that year. This snowpack data is collected by NRCS "snowtel" sites located throughout the mountainous areas that drain into the System. The Corps runoff forecasts are updated at the beginning of each month of the year as new data is received and is then used as input to computer models that simulate reservoir regulation. These reservoir regulation simulation models return data on anticipated System reservoir pool levels and river flows between the reservoirs and downstream of the System. Along with a "most-likely" runoff forecast for the year, the Corps inputs a range of possible runoff scenarios into the reservoir regulation simulation models to provide a range of potential reservoir pool levels and river flows for use by all river interest in planning their respective activities for the year.

Regarding long-term drought planning, the anticipated management of the water stored in Corps dam and reservoir projects, such as the System, is presented in what are known as water control manuals. The Missouri River Master Water Control Manual (Master Manual) presents the water control plan and operational objectives for the integrated operation of the System. This includes drought conservation measure to be implemented during low runoff periods. The Master Manual was first published in December 1960 and was later revised in 1973, 1975, and 1979. The first Master Manual and its subsequent versions were developed in consultation with State governments within the Missouri River basin and Federal agencies having related authorities and responsibilities.

In 1989, the Corps initiated a review of the Master Manual with consideration of other laws and regulations to include the following: ESA, the National Environmental Policy Act (NEPA), and the President's Council on Environmental Quality (CEQ) regulations pertaining to NEPA. A Final EIS has been published for the Master Manual Review and Update. We are currently in a review time period for the Final EIS and I expect to sign a Record of Decision for the Master Manual Review and Update shortly.

As previously stated, in accordance with the ESA, the Corps must insure, in consultation with the USFWS, that any action carried out by the Corps is not likely to jeopardize the continued existence of any Federally listed endangered or threatened species, or result in the destruction for adverse modification of their critical habitat. The Federal (Corps) action subject to ESA consultation is the management of storage and release of water, or "operation" of the System, the operation of the Kansas River Reservoir projects, and the operation and maintenance of the Bank Stabilization and Navigation Project (BSNP). The species of interest in regard to these projects are the pallid sturgeon (endangered), the interior least tern (endangered), and the piping plover (threatened).

The Corps entered into formal consultation with the USFWS pursuant to the ESA on the operation of the Missouri basin projects culminating in the USFWS Missouri River Biological Opinion issued in November 2000 (2000 BiOp). The 2000 BiOp concluded that the Corps' proposed action jeopardized the continued existence of the listed pallid sturgeon, piping plover, and the interior least tern, and recommended a Reasonable and Prudent Alternative (RPA) to avoid jeopardy.

Subsequently, the Corps and the USFWS have continued coordination and entered into both informal and formal consultation over the Corps' operation of the

System and other actions addressed by the 2000 BiOp designed to avoid jeopardy and conserve the Federally listed species. On November 3, 2003, the Corps requested reinitiation of formal ESA consultation on the operation of the System, the Kansas Reservoir Projects, and the BSNP. On December 16, 2003 the USFWS issued an amendment to its 2000 BiOp.

The 2003 Amended BiOp concluded that the Corps' proposed action would not jeopardize the continued existence of the interior least tern or piping plover. It also includes a "reasonable and prudent alternative" ("RPA") for the Corps' proposed operations that, according to USFWS, if implemented, will avoid jeopardizing the continued existence of the endangered pallid sturgeon. The Corps is currently working with the USFWS to coordinate implementation of the requirements of the 2003 Amended BiOp.

Mr. Chairman, this concludes my testimony. I would be happy to answer any questions.

The CHAIRMAN. Thank you very much, General. Your statement is in the record.

Now, Dr. Louis Uccellini. Is that correct?

STATEMENT OF DR. LOUIS UCCELLINI, DIRECTOR, NATIONAL CENTERS FOR ENVIRONMENTAL PREDICTION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Dr. UCCELLINI. Uccellini.

The CHAIRMAN. Uccellini. Boy, here I am with a name like Domenici and I cannot say yours.

[Laughter.]

Dr. UCCELLINI. My family has trouble with it too.

Good morning, Mr. Chairman and Senator Bingaman. I thank you for inviting me to discuss the ongoing drought in the Western United States.

I am Louis Uccellini, Director of the National Centers for Environmental Prediction, which is part of NOAA's National Weather Service. Two of the National Weather Service centers, namely the Climate Prediction Center and the Hydrometeorological Prediction Center, are closely involved with forecasting weather and climate variation related to drought.

Today I will emphasize the current drought status, provide a historical perspective, and discuss the most recent outlook, which was created jointly with the U.S. Department of Agriculture. I will also summarize research activities, including the role of the President's Climate Change Research initiative.

Now, the current drought status, which was provided in the longer testimony, shows that there has been some improvement. Nevertheless, severe to extreme drought covers most of the interior sections of the Western United States, as well as parts of the High Plains, with exceptional droughts centered in New Mexico and western Montana. The current situation involves a multi-year drought which began in 1999 across much of the West, worsened in 2000, and continued with some interruptions into 2004. This winter season has seen improvement in many locations. Snowpack and snow water content have been running close to normal during the winter snow season in many places, especially in the Great Basin and the Northwest, and are much improved since last year. Continued improvement in water supplies depends largely on snowfall continuing into spring, as snowpack contributes to 50 to 80 percent of the region's water supply.

Now, despite the recent snowpack improvement, some reservoirs remain disturbingly low across most of the region. As of March 1, 2004, four States—Nevada, New Mexico, Utah, and Arizona—report storage at or below 50 percent of normal. Impressive deficits in precipitation have built up over the past 4 to 5 years, a factor bound to swell any reservoir replenishment, which will be limited as snowmelt runoff is absorbed by the parched soils.

From a historical perspective, some drought indicators show the current multiyear drought in parts of the interior West as one of the most severe in the past 40 to 100 years. This drought is comparable to the severe droughts in the 1950's and 1930's in some areas, while not quite as severe in others. For example, the Colorado River basin storage this winter has been the lowest in more than 30 years, with Lake Powell at its lowest since 1970, when it was actually being filled, and Lake Mead at its lowest since 1968.

A new outlook for the short-term changes in drought has been released and is shown in figure 2. The precipitation from recent storms has been encouraging, boosting valuable snowpacks in the Southwest. The outlook for March suggests at least parts of the Southwest may experience above-normal precipitation. However, the latest streamflow forecasts from the USDA and National Weather Service for the spring and summer show that although there will be some improvement towards near-normal in many areas, we will still be below normal for the Southwest, especially Arizona and New Mexico.

The latest seasonal drought outlook shows improvements in drought conditions over the Great Basin and in the Great Plains. Limited improvement is possible in central and southern New Mexico and from western Colorado and eastern Utah, northward through Wyoming into Montana. We emphasize, however, that improvement does not mean total relief. As summer approaches, many reservoir levels are expected to remain below normal.

The seasonal forecast through the next 12 months shows no strong signals for either above or below normal precipitation.

As far as the research activities that we wish to summarize, we want to emphasize that as our understanding and skill improve, the ability to fine tune long-term climate models will increase. However, predictions for long-term climate at the regional level carry an increased level of uncertainty. To reduce this uncertainty, NOAA continues to invest in the advanced hydrological prediction services and also to applied research to better understand the interdependencies of the ocean and the land and the combined influence on climate and related impact on drought.

Recent data shows a warming trend for the past several decades over much of the West. Some climate models accurately predict a temperature increase consistent with this warming trend. These models project the warming trend will continue this century. However, neither the climate model predictions nor observations show any identifiable trend in precipitation.

NOAA continues to invest in research on the causes of decadal oscillations in the Pacific and Atlantic Oceans and the role they play behind the long-term drought. In addition, NOAA, the National Science Foundation, and sister science agencies in Mexico are co-leading the North American Monsoon Experiment, an inter-

national effort to enhance understanding of the sources and limits of predictability of warm season precipitation over North America, with a focus on the monsoon precipitation over the Southwest. This is critical for water resource management in the region.

Mr. Chairman, I would also like to bring your attention to the important work begun under the President's Climate Change Research initiative and the U.S. Climate Change Science Program. The President's call to advance climate change science and focus on the key uncertainties came to fruition in July 2003 when Secretary of Commerce, Donald Evans, and Secretary of Energy, Spencer Abraham, unveiled the Strategic Plan of the U.S. Climate Change Science Program, a 10-year management plan for climate research in the Federal Government that, for the first time, introduces goals, deadlines, and deliverables.

The strategic plan includes goals in the following areas that are relevant to drought research: the global water cycle, including measurably improved forecasts of precipitation and other water cycle variables for water managers, and increases in the efficiency of water use through better water models for policy and planning; land use and land cover and their relationship to the climate change; and ecosystems in developing information to support management decisions for agricultural lands, forests, fisheries, and other ecosystems under conditions of environmental change.

I thank you for this opportunity to testify before this committee.

[The prepared statement of Dr. Uccellini follows:]

PREPARED STATEMENT OF DR. LOUIS UCCELLINI, DIRECTOR, NATIONAL CENTERS FOR ENVIRONMENTAL PREDICTION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Good morning, Mr. Chairman and members of the Committee. Thank you for inviting me to discuss the ongoing drought in the Western United States. To complement its long-standing water supply forecasting done jointly with the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), the National Oceanic and Atmospheric Administration (NOAA) has greatly expanded its role in monitoring and forecasting droughts in recent years. I am happy to have the opportunity to talk to you about the current drought situation, its impacts on water supplies, the summer outlook, research, and how NOAA interacts with other agencies to deliver these drought products and related services.

I am Louis Uccellini, Director of the National Centers for Environmental Prediction, which is part of NOAA's National Weather Service (NWS). Two of our Centers are closely involved with forecasting weather and short-term seasonal and climate variations, namely the Hydrometeorological Prediction Center (HPC) and the Climate Prediction Center (CPC). The latter center is involved with drought monitoring and forecasting, and currently produces the seasonal drought outlooks and continues to play a key role in producing the U.S. Drought Monitor while working with other agencies to improve the tools used to monitor drought. In addition, the NWS' Advanced Hydrologic Prediction Services (ADPS) program leverages climate outlooks to provide improved water supply forecasts, and NOAA's Climate Diagnostics Center collaborates with the NWS to incorporate the latest research results into drought forecasting.

CURRENT DROUGHT STATUS

The current status of the western drought is shown in Figure 1.* Severe to extreme drought covers most of the interior sections of the Western United States, (herein referred to as the West) as well as parts of the High Plains. The current situation involves a multi-year drought which began in 1999 across much of the West, worsened in 2000, and continued, with some interruptions, into 2004. However, this winter season has seen improvement in many locations. Snowpack and

* Retained in committee folder.

snow water content have been running close to normal during this winter snow season in many places, especially in the Great Basin and Northwest, and are much improved since last year. Numerous winter storms have been dropping heavy snow over central and northern areas since December and over the Southwest since late February. The Southwest is still lagging, but the drought condition is improving. Continued improvement in water supplies depends largely on snowfall continuing into spring. Furthermore, the pace of spring snow melt is important in relieving drought conditions with a gradual snowmelt preferred over sudden melting.

Mountain snowpack is like money in the bank for western water supplies, as the snowpack contributes anywhere from 50 to 80% of the water supply in this region. Despite recent improvement in the snow conditions, reservoirs remain disturbingly low across most of the region. This is due to the long-term nature of the drought. Impressive deficits in precipitation have built up over the past four to five years. Deficits of 10 to 15 inches of liquid precipitation have occurred over a large area, and in some cases have exceeded over 20 inches, which is more than a year's worth of precipitation. As a result, soils have become exceedingly dry. Reservoir replenishment will be limited as snow melt runoff is absorbed by parched soils.

Reservoirs remain significantly below normal in every western state except California. As of February 1, 2004, four states—Nevada, New Mexico, Utah, and Oregon report storage at or below 50% of normal. As a consequence, water restrictions are in place in a number of locations. Water managers expect farmers in the hardest hit areas of the drought region to have reduced access to water for agriculture this spring and summer, as difficult decisions are made to balance the needs of water users—consumers, the environment, farmers, ranchers, and recreational users. Illustrating the difficult decisions these water managers face, as of January 31, Colorado River Basin water storage stood at 68% of normal, with Lake Powell in Utah at just 57% of normal storage, which is near the 5-year low for water storage.

HISTORICAL PERSPECTIVE

From an historical perspective of droughts in the interior West, some indicators of drought depict the current multi-year drought as one of the most severe in the past 40 to 100 years, comparable to the severe droughts in the 1950s and 1930s in some areas, while not quite as severe in others. For California's water supply/reservoir storage, this drought is not as bad as the 1988-93 drought.

Colorado River Basin storage this winter has been the lowest in more than 30 years, with Lake Powell at its lowest since 1970, and Lake Mead its lowest since 1968. Since Lake Mead began declining in late 1999, water storage has dropped nearly 40%. Water supply experts in New Mexico are telling us that serious shortages will persist in the state even with above-normal rain and snow this season, and some reservoirs may not even be restored by normal precipitation during the next winter season.

The West is largely a semi-arid region, and water supplies there are especially vulnerable to long-term shortages of precipitation. Historically, there have been long periods with enhanced precipitation as well as long periods with reduced precipitation, often lasting 20 or 30 or more years. Given the recent period from the 1980s into the 1990s had precipitation amounts above historical averages in the Colorado River Basin and the Southwest, it is only natural to expect there will be periods with lesser amounts of precipitation. In addition, population growth has placed increased demands on water supplies, so drought vulnerability has increased because of greater numbers of water users.

THE OUTLOOK

In order to fully appreciate the long-term outlook for the drought, it is helpful to understand the meteorological causes and ongoing research issues. Recent research, much of it coming from NOAA laboratories or from NOAA funded projects in universities, gives us some insight into the factors that we believe contributed to the multi-year drought. Studies based on collections of statistical and physical models show the important role that existing ocean and ground conditions play in establishing wind patterns leading to "blocking" in the atmosphere, an important factor in setting up the weather conditions which cause prolonged warm and dry conditions and cause reduced rainfall and above-normal warmth. Climate trends should also be considered when forecasting the future evolution of a drought. The West's climate has been getting warmer for about 20-25 years, especially in the winter and spring. These conditions contribute to the drought by increasing the rate of snow melt in the spring and early summer, and also increase water evaporation.

For the shorter-term drought outlook, trends in mountain snowpack and winter storms, as well as the medium and long-range forecasts of precipitation from CPC

are emphasized. The spring-summer streamflow forecasts from USDA/NRCS and NWS hydrologists are an important consideration for the water supply outlook in the West. Precipitation from recent storms has been encouraging, boosting valuable snow packs in the Southwest, an area which missed most of the storms before late February. The recent improvement in the Southwest follows the improvement in moisture conditions farther north earlier this winter, which resulted in some drought relief across much of the Northwest. The official monthly CPC outlook for March suggests at least parts of the Southwest may experience above-normal precipitation. The latest streamflow forecasts for this spring and summer produced by USDA's NRCS show an improvement to near normal for many central and northern areas of the West, but below normal for the Southwest. However, we expect the March Outlook will reflect the enhanced snowpack and show some improvement in the drought conditions for the Southwest.

Over the medium-term, seasonal forecasts through the next 12 months show no strong signals for above or below normal precipitation. The lack of El Niño or La Niña development creates much uncertainty in the seasonal outlooks, but the fact that the current Pacific Sea Surface Temperature (SST) pattern does not greatly resemble patterns associated with historical western droughts (e.g., cold water in the eastern Pacific) makes us somewhat more optimistic. The latest seasonal drought outlook (Figure 2), which combines forecasts for all time periods out to the end of May and considers recent trends in snowpack, presents a fairly optimistic picture, with likely drought improvement over the Great Basin and in the Great Plains. Limited improvement is possible in central and southern New Mexico and from western Colorado and eastern Utah northward through Wyoming into Montana. Of course, we always emphasize that improvement does not mean total relief. As summer approaches, reservoir levels are expected to remain below normal in many parts of the West.

RESEARCH ACTIVITIES

As our understanding of, and skill in forecasting, the seasonal to interannual climate range improves, the ability to fine tune long term climate models increases as well. However, predictions for long-term climate (herein defined as more than 1 year) at the regional level carry an increased level of uncertainty. In order to reduce that uncertainty, NOAA continues to invest in research to better understand the interdependencies of the ocean and land and the combined influence on climate. Recent data shows a warming trend for the past several decades over much of the West, especially during the winter season. Climate models, using historical data, accurately predict temperature increases consistent with this observed long term warming trend. These models project the general warming trend will continue for the remainder of this century. However, neither climate model predictions nor observations show any identifiable trend in precipitation.

Research at NOAA's Climate Diagnostics Center indicates recent decadal swings in precipitation in the West may be largely attributable to decadal variations in ocean temperatures, especially in the tropical Pacific and Indian Oceans. The causes of these ocean temperature variations are themselves not fully understood, but undoubtedly due in part to strong natural variability in the coupled atmosphere-ocean system, such as occurs with El Niño-Southern Oscillation. Even with unchanging total precipitation in this region, changes in temperatures may significantly influence the annual water cycle as well as water demand, with subsequent implications for water management.

NOAA continues to invest in research on the causes of decadal oscillations in the Pacific and Atlantic oceans and the role they play behind long-term drought. In addition, NOAA and sister science agencies in Mexico are co-leading the North American Monsoon Experiment (NAME), an international effort to enhance understanding of the sources and limits of predictability of warm season precipitations over North America, with emphasis on time scales from seasonal to interannual. Improved understanding and prediction of monsoon rainfall in the southwestern U.S. and Mexico is critical for water resource management in the region.

NOAA also supports four university-based Regional Integrated Sciences and Assessments (RISAs) programs in the Western U.S. that develop and provide improved drought information for decision-makers. Each of the four RISAs (located in Washington, California, Arizona and Colorado) focuses on regional issues related to assessing drought impacts, and improving the use and usefulness of forecasts and monitoring products for impact mitigation and cost reduction.

THE ROLE OF THE PRESIDENT'S CLIMATE CHANGE RESEARCH INITIATIVE

Mr. Chairman, I would also like to bring your attention to the important work begun under the President's Climate Change Research Initiative (CCRI) and the U.S. Climate Change Science Program (CCSP). Our ability to understand the large and complex forces at work on the planet will enable us to help develop high quality information for operational use by public works officials, city and county planners, forestry experts, and others charged with the responsibility of managing natural resources in communities across the nation. Furthering the science of climate change also helps policymakers on the local, state, and national levels make informed decisions.

The President's call to advance climate change science and focus on the key uncertainties came to fruition in July 2003 when Secretary of Commerce Donald Evans and Secretary of Energy Spencer Abraham unveiled the Strategic Plan of the U.S. Climate Change Science Program, a ten year management plan for climate research in the federal government that, for the first time, introduces goals, deadlines, and deliverables.

The Strategic Plan is also a milestone for drought and water research. Contained within it are research goals for the following areas:

- Global water cycle, including measurably improved forecasts of precipitation and other water cycle variables for water managers, and increases in the efficiency of water use through better water models for policy and planning;
- Land use and land cover change: identifying past and projected trends in land cover or land use that are attributable to changes in climate, and identifying U.S. regions where climate change may have the greatest implications for land management;
- Ecosystems: developing information to support management decisions for agricultural lands, forests, fisheries, and other ecosystems under conditions of environmental change.

When one takes into consideration the increase in population in the western United States and the challenges this expansion poses for resource management, the Administration's Strategic Plan comes at a critical juncture and will hopefully advance the state of knowledge for drought and water research in a way that assists resource managers and policymakers in their planning and policymaking.

COLLABORATION WITH OTHER AGENCIES

NOAA collaborates with many state and Federal agencies (e.g., NASA, EPA, USGS, and others) and universities to monitor, understand and predict drought. For example, NOAA works with USDA and the National Drought Mitigation Center in Lincoln, Nebraska to produce the weekly U.S. Drought Monitor, which also uses input from many other Federal and state agencies as well as feedback from a network of over 100 experts around the nation. NOAA works closely with USDA/NRCS on water supply forecasting in the western U.S., and relies on the USGS for streamflow data critical to both water supply and flood forecasting. NOAA also recently began collaborating with Canadian and Mexican meteorologists to produce an experimental North American Drought Monitor.

NOAA's National Weather Service is modernizing its network of cooperative observation sites to provide better coverage and more accurate measurements to aid in measuring drought. We are working with the Western Governors' Association to plan an ambitious program—the National Integrated Drought Information System (NIDIS)—to significantly enhance our ability to monitor drought across the country. Although the biggest challenge for NIDIS is to establish a modern, dense network of observing locations to observe and monitor all aspects of drought (a national integrated mesonet), the plan envisions greatly enhanced access to an entire range of data and information on drought conditions, impacts, and forecasts, and supported by a focused drought research program. NIDIS involves collaborating with many agencies to accomplish its goal, but NOAA will provide key leadership to establish NIDIS. We expect that this plan will be presented to the western governors at the annual WGA meeting in June 2004.

For drought forecasting, NOAA's Climate Prediction Center is developing techniques to forecast drought over seasonal periods. It issues outlooks at least once each month covering the next three and one-half months. CPC drought forecasters have been meeting with forecasters and researchers both inside and outside the U.S. to explore methods to improve the drought outlooks. Advanced forecast methods based on statistical and global numerical models will continue to be incorporated into drought outlooks, using the best forecasting tools and research available.

As part of NOAA's Advanced Hydrologic Prediction Service, the NWS will leverage increasing skill in climate forecasts to provide state of the art water supply forecasts for water management and other state and regional agencies.

Outside the West, where many areas depend on water stored in large reservoirs, summertime drought forecasts rely on long-term precipitation forecasts, and the usefulness of these forecasts will always be greatly limited by the arbitrary nature ("hit and miss") of summertime showers and thunderstorms over the U.S. Much work is needed to upgrade seasonal and longer-term outlooks. NOAA's research community will continue to interact with researchers throughout the country and the world in programs, such as this year's North American Monsoon Experiment (NAME) activity, to improve climate and statistical models, enabling a steady increase in our understanding of the causes of drought. Learning the mechanisms triggering drought will enable us to better forecast the likelihood of drought development months and years ahead of time.

We are encouraged by recent research that helps to explain the reasons behind drought development. It is a continuing challenge to produce seasonal forecasts that are consistently accurate. However, as with our weather forecasts, we believe we can keep improving.

Mr. Chairman, this concludes my testimony. I thank you for the opportunity to discuss drought and water supply in the West and the role NOAA plays in drought monitoring, forecasting and research. This topic is critical given the increasing population in the West and the increasing demand for drought information to help manage the demand for water. I would be happy to answer any questions you or other Members of the Committee may have.

Senator MURKOWSKI [presiding]. Thank you, and we will next go to Floyd Gaibler. Good morning.

STATEMENT OF FLOYD GAIBLER, DEPUTY UNDERSECRETARY FOR FARM AND FOREIGN AGRICULTURAL SERVICES, DEPARTMENT OF AGRICULTURE

Mr. GAIBLER. Thank you, Madam Chairman and Senator Bingaman. It is a pleasure to appear before the committee on behalf of the Department of Agriculture and discuss what our role has been in terms of assisting farmers and ranchers in rural communities during times of drought and other natural disasters.

Clearly drought is agriculture's most expensive, frequent, and widespread form of natural disaster. Each time drought occurs, several questions arise on how best to address the losses that are inflicted and how best to prevent, or at least mitigate, their costs in the future. There have been a number of attempts to address these various serious questions.

For example, in 1998, Congress passed the National Drought Policy Act that created the National Drought Policy Commission. The report from that commission stated that this Nation would benefit from a national drought policy based on preparedness and mitigation to reduce the need for emergency relief.

An outgrowth of that report was the establishment of an interim drought council and that council has met several times, most recently last October in Albuquerque. The purpose was to establish a coordinated approach to address the impacts of drought through preparedness, monitoring, risk management, and response to drought emergencies. And among other things, the council has developed a web site to increase communications between agencies and awareness of what is being done on the State and local level.

While the drought in 2003 was not all-encompassing nationwide, it clearly remained entrenched in and across much of the Western half of the United States. Several Western States, in fact, experienced significant drought conditions at the local level.

The Department has closely monitored the drought through collaboration with other Federal agencies that are appearing here on this panel today.

Regarding the current drought status and water supply situation, clearly some regional snowpacks have improved significantly, but at the same time, others, particularly in parts of Arizona, continue to be below average.

Again, looking at reservoir storage for all Western States, except California, it is running below historic averages, reflecting the carryover dryness of the continuing drought. While a majority of the basins are forecast to receive average or slightly above average spring and summer streamflows, a number of critical basins are running either below or well below.

In response to these drought conditions, last year Secretary Veneman directed the formation of a departmental Drought Coordinating Council to more closely monitor these conditions and coordinate our resources to assist drought-affected producers and rural communities. We have in place a number of programs to help producers during losses attributable to drought. One example is a partnership we have with the State departments of agriculture to distribute surplus non-fat dry milk for use in livestock foundation herds in drought-stricken States.

In another innovative partnership, USDA agencies have worked with the Department of the Interior and the State of Oregon to deliver badly needed water to the Klamath Basin producers.

We also have several agencies that have worked to mitigate the impacts of drought on grazing land and croplands.

Through other various programs, the Department has provided low-interest emergency loans, funding for non-insurable crop losses, cost share assistance to rehabilitate farmland, and loan programs for rural areas for new water sources, backup source, and new wells.

Finally, the Department has focused ongoing drought research in areas such as mitigation, plant stress, and water efficiency, water conservation, soil moisture, and weather prediction and remote sensing. We feel that the drought council has had a successful program and all of its partnering agencies have played a crucial role in improving the capabilities of predicting and mitigating the forces of nature.

In summary, USDA has long supported efforts to mitigate the effects of drought on America's farmers and ranchers in rural communities. We look forward to working with this committee and the Congress to address the many concerns associated with the remaining challenging issues surrounding drought and related disasters.

Again, I thank you for the opportunity to appear before the committee and we would be happy to entertain any questions. Thank you.

[The prepared statement of Mr. Gaibler follows:]

PREPARED STATEMENT OF FLOYD GAIBLER, DEPUTY UNDERSECRETARY FOR FARM AND FOREIGN AGRICULTURE SERVICES, DEPARTMENT OF AGRICULTURE

INTRODUCTION

Mr. Chairman and members of the committee, thank you for inviting the Department of Agriculture to testify before this committee. I appreciate the opportunity to

come before you today to share with you what the USDA is doing to help farmers and ranchers in this country during times of drought and other natural disasters. America's farmers and ranchers play an important role in providing stable, safe, and affordable food supplies to the citizens of this country.

USDA helps ensure the well-being of U.S. agriculture through efficient and equitable administration of farm commodity programs; loans; conservation and environmental programs; federal crop insurance; and emergency and disaster assistance programs. These programs are major components of USDA's farm safety net, which helps producers maintain viable operations, compete for sales of commodities, and contribute to the year-round availability of low-cost, safe and nutritious foods.

Drought is agriculture's most expensive, frequent, and widespread form of natural disaster. Drought will occur at some time every year somewhere in the United States resulting in substantial losses each year. USDA's Federal Crop Insurance Corporation (FCIC) payments alone for drought losses have averaged $462 million annually (33 percent of total FCIC payments), since 1989. Over half of the total $4.1 billion in 2002-crop insurance indemnity payments, or some $2.5 billion, were for drought related causes.

One-half to two-thirds of the counties in the United States have been designated as disaster areas in each of the past several years. Each time drought occurs, many of the same issues are raised. Principally, how much damage was inflicted, on whom, and where? Who is going to pay for it? How can we prevent or at least mitigate damages and their costs in the future? There have been a number of attempts to address these very serious questions.

For example, in 1998, Congress passed the National Drought Policy Act that created the National Drought Policy Commission. The Commission submitted its report to the President and Congress in May of 2002. The report stated that this nation would benefit from a national drought policy based on preparedness and mitigation to reduce the need for emergency relief. The Commission's report identified 83 drought-related federal programs, including 41 within USDA.

In October, USDA and non-Federal partners, in Albuquerque, New Mexico, jointly hosted the Interim National Drought Council meeting. Representatives from drought impacted groups, state/local governments, congressional offices, Department of the Interior, Environmental Protection Agency, Department of Commerce, Federal Emergency Management Agency, Small Business Administration, Department of the Army, and USDA worked to establish a coordinated approach to address the impacts of drought through preparedness, monitoring, risk management, and response to drought emergencies.

2003 DROUGHT IN REVIEW

During 2003, drought remained entrenched across much of the western half of the U.S. and in the northern and western Corn Belt, but thankfully did not spread nationwide. A lack of moisture for winter wheat emergence and establishment also occurred in several key-producing areas, particularly across the northern and central High Plains and the Northwest. Elsewhere, drought was primarily hydrological, lowering reservoir levels and reducing irrigation supplies.

Even though the drought was not all-encompassing nationwide, there were still quite a number of States and counties that experienced significant drought conditions at a localized level. For example, seven entire States (Arizona, Arkansas, Maine, Mississippi, Nevada, South Carolina, and Utah) received disaster designations by Secretary Veneman in 2003. In total, 2,351 counties received disaster designations in 2003. Of this total, 1,596 counties across 32 States received disaster declarations due to drought conditions.

For a county to qualify for a Secretarial disaster designation it must have sustained a 30 percent production loss in a single major enterprise, or there must be at least one producer in the county that sustained a 30 percent production loss in a single major enterprise and is unable to get financing with other lenders in the area at reasonable rates and terms.

In 2004, counties in 25 States, including Arkansas, Colorado, Connecticut, Idaho, Indiana, Kansas, Kentucky, Massachusetts, Michigan, Missouri, Nebraska, Nevada, New Jersey, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, Washington, and Wisconsin, have applied for Secretarial disaster declarations for drought.

As of March 1, a total of 217 counties in eleven States have been designated as primary natural disaster areas by the Secretary due to production losses from all causes, during calendar year 2004 to date. An additional 248 counties, in 27 States, have been named as contiguous counties during the same period.

In addition, 173 of the 217 primary counties have been designated, due to drought and drought related causes during calendar year 2004 to date. Those 173 counties represent 5 States. Also, 138 of 2487 contiguous counties have been named, due to drought during the same period. Those 138 counties represent 15 States.

Lastly, while the economic effects of the 2003 drought have been significant for some producers, national crop and livestock returns have shown little effect. Despite widespread hot, dry conditions last summer, aggregate U.S. yields were up for wheat and feed grains in 2003. National average corn yields were a record and up more than 9 percent from 2002. With a rebound in world market prices, crop revenues in 2004 are projected at a record $114 billion, compared to $107 billion in 2003 and $99 billion in 2002. Likewise, despite persistent poor forage conditions in the Mountain West and the discovery of a BSE-infected cow in Washington state, the value of livestock production is forecast to be $101 billion in 2004, which would be only the third year in which it has exceeded $100 billion.

WESTERN DROUGHT STATUS AND WATER SUPPLY SITUATION

The current drought in the interior West is part of a multi-year drought that began in 1999, worsened in 2000, and has continued, with some interruptions thus far into 2004. As a result, the drought in the West was slow to develop, and likewise, will be slow to recede.

The current drought in the West is primarily hydrological, lowering reservoir levels and reducing irrigation supplies. The USDA collaborates with several federal and non-federal agencies to produce the "U.S. Drought Monitor" report. The Drought Monitor is an operational product that is released weekly. The product serves as a useful tool in depicting the intensity, spatial extent, and potential impacts of drought across the country.

From the February 24, 2004 "U.S. Drought Monitor", most of the Intermountain West is experiencing some degree of drought. "Moderate Drought" affects a large portion of the Intermountain West, with "Extreme Drought" affecting the Rocky Mountain States. "Exceptional Drought" is affecting southeastern Idaho and southwestern Montana, a small portion of southwest Wyoming, a small portion of northeast Utah and parts of southern Utah, northeastern New Mexico, and southern New Mexico. The magnitude of the drought in the West is highly unusual. "Exceptional Droughts" typically have less than a 2 percent chance of occurrence, while "Extreme Droughts" have a 2 to 5 percent chance of occurrence.

Snowmelt provides approximately 80 percent of the streamflow in the West. Precipitation, accumulated as snow in the winter months, melts and runs off during the months of April through July. This snowmelt is captured in reservoirs for use during the irrigation season of May through September. Data is collected on the amount of precipitation, runoff, and snowpack content in a given year to anticipate the approximate amount of water that will be available.

USDA's Natural Resources Conservation Service (NRCS) Snow Survey and Water Supply Forecast Program installs, operates, and maintains an extensive, automated system to collect snowpack and related climatic data in the Western United States called SNOTEL (for SNOwpack TELemetry). The system evolved from a NRCS's Congressional mandate "to measure snowpack in the mountains of the West and forecast the water supply."

In cooperation with National Oceanic and Atmospheric Administration's National Weather Service, NRCS collects snow information through a network of about 680 SNOTEL sites and 900 traditional snow courses. Using the data collected, NRCS issues over 11,000 water supply forecasts annually for water users in 11 western states and Alaska. Agricultural, municipal, industrial, hydropower, and recreational water users are the primary recipients of these forecasts. Water supply forecasts and climate information help irrigators make the most effective use of available water supplies for achieving their agricultural production goals. Farmers who collectively irrigate more than 10 million acres of land in the western U.S. benefit from these information products. Other Federal agencies and private organizations also use water supply forecast information to help them carry out their missions.

Seasonal snowpacks for the period October 1, 2003 through the present, improved significantly in the Pacific Northwest and Intermountain West when compared to last year's snowpack, which was 40% to 70% of average. Current snowpacks are above normal, averaging 125% in Oregon and northwestern Nevada. Snowpacks remain near average in the Washington, Idaho, Montana, Wyoming, Utah, Colorado, and northern New Mexico. In spite of recent storms, snowpacks continue to be below average in central Arizona and southern New Mexico, ranging from 65% to 80%.

As of February 1, 2004, reservoir storage for all western States except California is running below historic February averages, with Nevada, New Mexico, Oregon,

Utah and Wyoming reporting the largest storage deficits. Low storage values reflect carryover dryness of the continuing drought in the Intermountain West, Southwest, and southern Rockies and last year's below average seasonal runoff.

As of February 1, 2004 a majority of basins in the Pacific Northwest, northern Rockies of Montana and Idaho and central California are forecast to receive average, or slightly above average, spring and summer streamflows. Conversely, many basins in Arizona, New Mexico, the south Platte River of Colorado, and the Bear River of southeastern Idaho are forecast to receive well below average spring streamflows, less than 50% of average. Most basins in the Intermountain West and eastern slopes of the Rockies in Wyoming and Colorado are forecast to receive below average spring and summer streamflow, 50% to 90% of average.

USDA EFFORTS TO ADDRESS DROUGHT

Secretary Veneman formed a departmental Drought Coordinating Council on April 8, 2003, within the USDA, to monitor conditions and coordinate resources to assist drought-affected agricultural producers and rural communities. The Council is comprised of key USDA senior level officials and is chaired by the Deputy Secretary. The Council continues to meet on a regular basis. The Council monitors drought conditions and coordinates resources to assist affected agricultural producers and rural communities.

We at USDA recognize that drought has resulted in periodic degradation to our natural resources and has devastated many farming and ranching operations across the country. USDA leads the nation's efforts to minimize risks associated with farming and ranching and provides critical assistance when drought occurs. We currently have in place several programs to help producers enduring losses that are attributable to drought. Some of USDA's disaster programs are mandated and funded annually by Congress. Access to FSA's low-interest emergency farm loans is just one example of such assistance.

To best meet producers' diverse needs, USDA agencies often collaborate with each other and outside partners to deliver dynamic, adaptable, disaster assistance programs. One example of this is the Farm Service Agency's (FSA) partnership with State Departments of Agriculture (SDA) to distribute nonfat dry milk for use in livestock foundation herds to twelve drought-stricken States and one tribe.

In another innovative partnership FSA worked with the Department of Interior and the State of Oregon to deliver badly needed water to Klamath Basin irrigators. The agencies recharged a principal canal to assist farmers and restore the health of the ecosystem. Also, the Natural Resources Conservation Service (NRCS) has worked with farmers, ranchers and other partnerships in the Klamath Basin to conserve water on irrigated farm and ranchlands in the Basin. These measures, including converting farmland from flood to sprinkler irrigation, have been implemented on over 16,000 acres, resulting in 6,700 acre-feet of water being conserved on-farm.

USDA has developed other innovative ways to help farmers and ranchers. USDA provided $857 million Livestock Compensation Programs (LCP) I, and provided 253 million pounds of non-fat dry milk to cattle under the Cattle Feed Program. Congress later appropriated funds of $252 million for LCP II.

Several USDA agencies work aggressively to expedite drought assistance and mitigate impacts. Last year the NRCS stepped up pre-drought planning and mitigation by applying 30,500 new resource management systems on 16.8 million acres of grazing land and, at the same time, installing 15,600 irrigation management measures on 1.9 million acres of cropland.

The USDA's NRCS implements numerous conservation programs that are beneficial for drought mitigation, including conservation and watershed planning measures. In addition, cost-share program assistance helps agricultural producers experiencing drought. For example, the Environmental Quality Improvement Program (EQIP) can address resource impairments that are the result of drought. EQIP funds are being used to fund the establishment of cover crops or conservation tillage, in order to keep wind erosion under control. Other examples include incentive payments for prescribed grazing and management of drought-related pests such as grasshoppers.

The Ground and Surface Water Conservation component of EQIP is utilized to directly assist producers make more efficient use of water resources. Examples include converting irrigation systems to less water-intensive practices such as drip irrigation, and in some cases switching a producer to dryland farming. This program in past years has been targeted specifically to assist states experiencing drought. The NRCS also provides several conservation programs that are beneficial for drought mitigation, including conservation and watershed planning measures.

In 2002, the Noninsured Crop Disaster Assistance Program (NAP) paid out approximately $220 million dollars of which it is estimated that $147 million was associated to drought. The Emergency Conservation Program (ECP), which provides cost-share assistance to agricultural producers to rehabilitate farmland damaged or destroyed by natural disaster and to provide emergency water conservation measures in times of severe drought, provided $17.4 million in drought-related assistance to 27 States.

Drought conditions also brought additional help from the Animal and Plant Health Inspection Service (APHIS). Last year, APHIS had treatment money available to eradicate grasshoppers and Mormon crickets. Increased populations of these insects go hand-in-hand with increased drought conditions. APHIS provided treatment assistance in nine states, protecting a total of 1.2 million acres.

In addition, USDA's Rural Utilities Service provides direct and guaranteed loans and up to 75% grants for water, waste disposal, and solid waste facilities in rural areas. Drought related programs include new water source, backup source, and new wells. Fiscal year 2003 funding totaled $1.4 billion, with $813 million for water purposes. While Agricultural Research Service's (ARS) funding for fiscal year 2003 research was $23 million dollars. ARS focuses on four major areas of drought research: Mitigation, Plant Stress and Water Use Efficiency, Water Conservation and Soil Moisture, and Weather Prediction and Remote Sensing.

Information on USDA disaster assistance is also available at: *http://disaster.fsa.usda.gov*.

Reducing this nation's vulnerability to the consequences of drought is the cornerstone of USDA's national drought policy. The Drought Council is a proactive partnership helping to improve drought planning, preparation, and mitigation. The Drought Council and all its partnering agencies have played a crucial role in improving capabilities for predicting and mitigating the forces of nature. But when drought or other natural disasters do strike, USDA is continuing to help farmers survive and overcome adversity.

CONCLUSION

Drought is perhaps the most obstinate and pernicious of the dramatic events that Nature conjures up. At its most severe, dust bowls once eroded the American landscape, causing hundreds of millions of dollars in losses, and dashing hopes and dreams for thousands of families. Today drought is still agriculture's most expensive, frequent, and widespread form of natural disaster that continues to perplex and inflict its misery on our nation's farmers and ranchers.

The National Drought Policy Act of 1998 presented this country with a significant opportunity. The law recognized the need to prepare for and lesson the severe impacts of drought on the American people and the environment. It created the National Drought Policy Commission to advise Congress on formulation of national drought policy based on preparedness, mitigation, and risk management, rather than on crisis management.

Oftentimes, USDA's role lies at the forefront of disaster relief and management for producers throughout the nation. When disaster strikes, USDA has programs and assistance that can be made available to help producers recover crop losses, the cost of rehabilitating farmlands, and for emergency water assistance.

In summary, USDA has long supported efforts to mitigate the effects of drought on America's ranchers and farmers. We look forward to working with Members of Congress to address the many concerns associated with the challenging issues surrounding drought and related disasters.

Senator MURKOWSKI. Thank you all, gentlemen. I appreciate your testimony here this morning.

As the chairman of the Subcommittee on Water and Power, I have an opportunity to spend a lot of time focusing on this issue, and I appreciate you coming before the full Energy Committee this morning to give this update.

In our subcommittee, we have been looking at very specific projects, the CALFED/Bay Delta Authorization Act, the Gila River water settlement. We are going to be taking up rural water supply legislation next week, and we are also going to be looking at proposals for desalinization projects, as well as hearings on dam safety. I think some of you will be joining us at those upcoming hearings.

But as you certainly have recognized in your testimony today, the issues of supply and demand as they relate to water and how that affects economy, how it affects our agriculture, really how it affects how we live in this country is quite key. So I appreciate all that you do in bringing your perspectives this morning.

The first question is more a general one to those of you who would choose to speak up on it. You have each testified about key data collection and resource assessment activities. You have certainly brought a good deal of insight from your perspective, but the interaction between the various agencies—one could suggest that there is a haphazard approach or coordination between agencies, States. I guess I would ask if it is fair to characterize the cumulative Federal effort to understand water resources, predict future water resource needs and supplies and build a basis for the best possible management—would you suggest that it is poorly coordinated? Give me your perspective on that coordination between the various agencies on this.

Mr. Raley, do you want to go first?

Mr. RALEY. Thank you, Senator. A pleasure to be here.

Yes, I would say it is poorly coordinated not through the fault of any individual, but as we have developed a water policy particularly in the West for the last 100 years, there have been assignments given by Congress to a wide range of different agencies. As much as all try, we have difficulty keeping each other up to speed on the latest developments.

Senator MURKOWSKI. How can we improve it?

Mr. RALEY. Well, I am aware of efforts to have, in essence, one-stop shopping on the web using the President's e-gov initiative and drought research and tools that are largely driven by and the responsibility of agencies outside of the Department of the Interior. We looked at it because the USGS, which is a part of Interior, has a role in this in terms of gauging and some research, but concluded that it would be counterproductive for us to assume that the Interior Department should be the focal point for that data collection, that we should coordinate with USDA and NOAA because they were working with the Western States Governors Association, pulling together this goal of one-stop shopping in terms of information. So I think continued focus by all agencies, with assistance from Congress in terms of helping us keep that focus, would be helpful.

As to planning for drought, I would observe that we have a longstanding and deeply rooted policy of federalism with respect to Western water issues, which means that the Federal Government's proper role is to some degree subservient to the States that have the lead role on water policy and allocation. That inherently means that we have 17 subsets of Federal water policy, and that is the way the West has wanted it. And at Interior, we certainly support that.

Senator MURKOWSKI. Anybody else? Any comments on how we can improve the coordination?

Dr. UCCELLINI. Yes, I would like a few comments. I think it is fair to say that there have been improvements over the past 10, 15, 20 years in terms of coordinating on data amongst the, for example, National Weather Service and the Department of Agriculture and USGS in terms of receiving data that we need to make fore-

casts and us providing data and information that people need to make decisions.

But having stated that, it is also clear that much more needs to be done in terms of coordinating existing and planned data, especially remotely sensed data and how the information is used in the decision-making process. It not only influences the decision-makers but influences those who are providing that information, especially as we are working towards improving our forecasts and trying to describe the uncertainties in those forecasts to those who have to make decisions.

So a focused effort on a problem like drought helps bring this together both in terms of data that goes in to analysis and forecast systems and how the information then comes out of the forecast system and is used by decision-makers.

There is an ongoing activity that is actually coordinated through the Western Governors Association. It is a National Integrated Drought Information System, NIDIS. It is in a draft phase. It is a drought early warning system for the 21st century and it is trying to bring these issues together in terms of how we best use the observations, how we make that coordination function happen more efficiently and bringing all these observations together, and then again, getting the forecasts out to the decision-makers in a more effective manner.

Mr. GAIBLER. I would just make the observation that from our experience the Interim Drought Council I mentioned is a good vehicle to try and bring together everything that is being done across our various agencies to attempt to broadly address the drought issues and also to build a better relationship with the States and the affected communities and producers that are directly impacted by that. I believe that there could be better and closer coordination and efforts behind that council process. It is one area, at least from our perspective, that we could recommend that could be improved.

General GRISOLI. Senator, I would like to agree with my colleagues on their comments so far.

I would like to add that the more I got into this particular area, having been serving in the Pacific Northwest in the Missouri River and the Columbia River basins, the basins are done differently, each handled a little differently with the Federal agencies, and I can see that we probably could learn from each other a little bit more about how we interact with State, Federal, and our other stakeholders by sharing information between the basins, handling some of the many challenges. They are very different and complex, but some things they share which are the same, which is making sure we share information and we work together as a team to solve problems.

Senator MURKOWSKI. Mr. Raley.

Mr. RALEY. Senator, if I could add. When Secretary Norton decided to look at these water policy issues that are within the purview of Interior, we were very aware of the recent history of what was, I believe, started by Senator Hatfield from Oregon of the Western Water Policy Review Commission. That was a well-intended effort. As I understood it, the goal for that effort was to attain coordination between the agencies, the heart of your question. My personal observation is that a lot of people put a lot of time and

put a lot of money into that effort, and I would say that it is difficult, if not impossible, to identify any consequence of all that work.

Secretary Norton and the Interior Department were very aware of that well-intended effort and the fact that it has had virtually no impact on water policy, and that is why Water 2025 focuses on things that we know can be done on the ground to make a difference. There is something in the middle there, I recognize, between the laudable and absolutely essential objective of having coordination which will always fail that no matter how hard we try, but we have to make that effort. Moving forward with reality and dealing with things on the ground, there is something in the middle there.

But we are quite reticent as a Department, particularly given our strong adherence of principles of federalism to tread the same path as was trod for the last 8 years because we are not sure that we would end up with a different result, and we are fairly certain that even if we came to a different conclusion in theory, the consequences on the ground might be the same as they were and are of the Western Water Policy Review Commission, which is virtually nothing.

Senator MURKOWSKI. Well, I will come back. I want to ask a question or two about the Water 2025.

Senator Bingaman, would you like to ask a couple questions here?

Senator BINGAMAN. Thank you very much, Madam Chairwoman.

Let me start just trying to follow up on the same line of questioning. I am struck by a couple of different statements contained in the testimony. Dr. Uccellini, you have this statement in your testimony where you say mountain snowpack is like money in the bank for Western water supplies as the snowpack contributes anywhere from 50 to 80 percent of the water supply in the region. I do not think anybody who has seen the benefits of a good snowpack would disagree with that.

There was an article that was put out last month by the Pacific Northwest National Laboratory where they reported on a study that one of their scientists did where they concluded global warming will diminish the amount of water stored as snow in the Western United States by up to 70 percent in the coastal mountains over the next 50 years.

So it strikes me that we seem to have agreement we ought to have a policy to deal with the problems of drought. Most of the problems of drought are directly related or going to be directly related to whatever this phenomenon is of global warming, the warming of temperatures and the elimination of snowpack that results from that.

Would you agree that is a big part of the problem which is leading to this prospect of sustained drought throughout the West?

Dr. UCCELLINI. Well, it is very clear that the climate pattern dictates the long-term precipitation regimes and the weather features that produce these snows and rains that we need for our water resources. So as that climate changes, there will be changes in such things as storm tracks which produce snow and rain. One of the areas of very intense research is linking these climate changes to

these types of weather features that will produce your winter snows, the spring and summer rainfall.

There is a lot of controversy involved in how one goes about modeling these factors, but there is increasing progress being made in getting consistent, say, postmortems done over, let us say, the past 30–40 years in terms of how things have evolved with respect to what we have been able to observe and then try to use those same models and project out into the future.

What we are seeing is that the models are converging towards a warming atmosphere, especially in the mid latitudes and up towards the poles. But the effect on the precipitation is still indeterminate in the sense that there are still wide variations in the weather patterns within the climate changes. As our testimony indicates, we are being cautious in how to extract what we have been able to learn about the use of the models for temperature forecasts out into the future in terms of making precipitation forecasts.

One other factor that we are——.

Senator BINGAMAN. Finish up quickly because I am going to be out of time before you finish answering that first question.

Dr. UCCELLINI. We cannot discount the importance of the oceans and the ocean evolution in terms of what is going to happen with the climate and respective storm tracks. We are really just coming to grips with the ocean atmospheric coupling which we have shown is important for our rainfall and snowfall over the Western United States, but exactly how to use that and project into the future is still uncertain at this time.

Senator BINGAMAN. Let me shift to another issue. Secretary Raley, I wanted to ask you. The Department's publications, particularly with regard to Water 2025, constantly mention Klamath River and the Middle Rio Grande basins as serious problem areas that you need to deal with. Unfortunately, it seems to me that your treatment of the two basins is extremely different.

In the fiscal year 2005 budget, the Department has proposed a cross-cut budget of $67 million to address problems in the Klamath Basin, using resources from Reclamation and the USGS and the Fish and Wildlife Service and the BLM and the BIA and even the Park Service. And so you have that cross-cut budget.

In the case of the Middle Rio Grande, as I read what you are proposing, it is a cut of $9.5 million from Reclamation's budget for the Middle Rio Grande ESA compliance, leaving only $5.9 million for fiscal year 2005. And to add salt to the wound, the Fish and Wildlife Service has eliminated any funding for the Middle Rio Grande bosque initiative.

Why is it not appropriate to do a cross-cut budget for the Middle Rio Grande like you do a cross-cut budget for the Klamath Basin and try to provide adequate funding to actually do what this 2025 initiative says needs to be done?

Mr. RALEY. Senator, you make a point that is quite appropriate in terms of timing because, as you know, we are working through the next budget cycle, and I think it would be entirely appropriate to have, for the next budget cycle, a cross-cut budget that focuses within the Department on identifying all opportunities in the Department to deal with the complex issues in the Middle Rio Grande.

I would suggest one of the issues is we have wanted to be very respectful in the Middle Rio Grande of local complexities, and we are waiting for some of the processes that are ongoing, have been ongoing for some time, to ripen further so that we do not put ourselves in a place of the Department of the Interior telling the people of New Mexico what the answer is. As you know, your constituents have quite diverse opinions, and I think they are making progress towards finding a common ground, but more work is yet to be done on the ground.

Senator BINGAMAN. Well, I can assure you even those who are jealous of their prerogatives are not offended when resources are provided, and so I would urge that you look at that again. Thank you.

Mr. RALEY. Thank you, Senator.

Senator BINGAMAN. Let me also ask about the Ogallala Aquifer. This is not an issue which I think was dealt with in any of the testimony. At least, I did not hear it. I have been concerned for some time about the depletion in the groundwater in the Ogallala Aquifer, particularly in eastern New Mexico and west Texas and some of the other States in that area. We passed legislation through the Senate to provide additional authority to the Geological Survey to work in cooperation with the States to map and characterize and model the High Plains Aquifer.

I would ask you, Secretary Raley, is this something that you in the Department of the Interior could get behind and help us persuade the House to pass?

Mr. RALEY. Senator, this effort is actually something that I have some nominal experience with, going back to a job I had in college, which was working out on the ground interviewing people about declining aquifer rates. I have watched that issue in the studies over time.

One of the policy issues that we have raised, understanding that there are very severe consequences in local communities to the rate of drawdown is what the marginal return is for greater specificity in the modeling—in other words, what we can produce—and I have no lack of confidence that the USGS can always produce yet more models, better models, and provide more predictive tools.

Given that these decisions, with respect to groundwater management, are made by the States, we are wondering what the added value is for yet a better model when, quite frankly, we understand the trends. We understand what drives the trends of drawdown for this resource. It tends to be agricultural prices and energy prices and the profitability of drawing the water. We are trying to make sure that the money that is spent on this effort results in information the decision-makers like you can use, and that is what we are struggling with.

Senator BINGAMAN. Well, let me give you an example of how we could use that information here in the Congress. Last Congress, in the farm bill, we included a provision for an incentive program for groundwater conservation. We put in there some funding to assist farmers who would be willing to shift to more efficient methods of irrigation.

I was going to ask Mr. Gaibler, if you could tell us whether or not this program is working in your view, whether this demand for

funding is what you expected, if additional funding is needed, and how many upgrades of irrigation equipment have occurred? Do you have any kind of report you could give us on any of that?

Mr. GAIBLER. Yes, Senator. We do have some information that was provided in my testimony that describes various irrigation measures, management measures, that have been implemented, as well as installing 15,600 irrigation measures on about 2 million acres of cropland. Through another one of our programs, the environmental quality incentive program, cost-share assistance funds have been provided for the establishment of cover crops and use of conservation tillage to keep wind erosion under control. Other areas of increased focus of water-intensive practices such as using drip irrigation and in some cases trying to provide farmers incentives to produce crops that have less water-intense use.

As to the specific levels of funding, I would be happy to provide you more specifics, and further identify if there are shortfalls where we are not able to meet those demands.

Senator BINGAMAN. Let me just make one other comment and then I will stop, since I assume my time is up, although we do not seem to have a timer operating today.

I do think that if we are going to have good forward-looking policies adopted at the State level or at the Federal level or at the local level, with regard to water use out of these aquifers, we need the best information we can get. This is one small example of what the Federal Government might be doing and it possibly could do much better. Clearly the States and localities could do a better job if they had more reliable and timely information about the extent of the depletion of that underground aquifer.

Thank you very much, Madam Chairman.

Senator MURKOWSKI. Mr. Raley, just quickly on Water 2025. Obviously, some very good, very positive things coming out of the administration there, the Challenge Grants program. I am pleased with the administration's efforts to expand the management of the invasive plants like the salt cedar and the Russian olive.

The desire to provide new technology is also exciting, but there is an aspect of funding that when one looks at it, you say, well, this is a little bit troublesome here, and this specifically as it relates to funding desalinization, reuse, and a few of the other programs. In 2004, it seemed that we were looking at some increases in funding, but the administration's 2005 budget clearly has devalued certain of these programs and eliminates much, if not all, of the previous year's gains.

So I would ask whether the administration supports the desalination and other water purification technology development as a key to one of our long-term solutions, and if that support is there, why we have seen the decreased support for the desalination R&D and other programs that would expand these water supplies.

Mr. RALEY. Senator, we are very supportive of Interior's role as a participant in driving the research for desalinization as far and as fast as possible. Our understanding is that the primary factors affecting the economic viability of desalinization, whether it be sea water desalinization or brackish groundwater desalinization, which is also of interest to the Department, given the vast areas, some of which need clean drinking water, that Interior deals with—the

two drivers are energy costs and disposal costs of the brine or whatever else that is taken out of the water so that it is drinkable.

There are gains to be made in technology that we do not want to look past, but our assessment was that, to be very blunt, Interior's ability or appropriate role on desal is to contribute its part with respect to funding the research to drive it as fast as possible so that the benefits of that could be shared nationwide and even internationally. People are interested in these technologies from basically all the southern coastal States. So Florida is interested. Texas is interested, clearly California, as well as areas inland.

Given that we have other demands, our intent all along has been to take what we have, focus it on research, and let other agencies, some of whom are sitting at this table, take the lead on other aspects of alternative water supply development, all of which are great. It is just that Interior cannot be all things to all people, and it does not have an inherent role or capability, say, to be the best waste water treatment plant engineers in the world. That is expertise that is either at the State and local level or at EPA or elsewhere in the Federal Government. And we thought it appropriate and most effective to let them take the lead and that we would focus on the research side in desalinization, and then within that policy parameter, we want to stretch people's money as far as we can and spend it most effectively. That is why the President sends a budget to you so we can engage on exactly how we achieve that common goal.

Senator MURKOWSKI. As far as the other goals set out in Water 2025, are there additional authorities that are needed by the administration in order for these to be effective?

Mr. RALEY. We believe we have adequate authority with respect to research, although depending on how the research road map that I believe Senator Domenici had a role in and others on this committee in having Interior proceed, depending on the direction that that research road map goes, it may be possible we would need additional authority in the future. We think we can continue to play the role that we think is appropriate for Interior.

Again, there are six to nine agencies in the Government that deal with desalinization. We do not see desalinization as one that inherently should or has to be an Interior function. If it can be done more effectively in the Department of Energy or by the Department of Defense, we just want the job done and are not trying to protect a program just because it happens to, for historic reasons, live within Interior.

Senator MURKOWSKI. Now, I am assuming that Water 2025 will overlap with the administration's proposed rural water program, and I am hoping that we have got your commitment that we will work together to refine these legislative proposals for rural water and get those worked through.

Mr. RALEY. Absolutely, Senator. We have been quite anxious to get this legislation up to you. We understand that from an Interior standpoint and obviously from the perspective of members of your committee, this is an important issue. The legislation that has been forwarded to you is our attempt to proceed with this issue from an Interior perspective.

I would note, though, that this is another issue that, first of all, has got national applicability, and Interior's water supply role is limited to the 17 Western States. There are many communities that have an interest in this and Interior does not necessarily have a role in those areas and probably should not.

If we were to look for progress in good government, over time I think that the administration, any administration, is going to need to engage with the Senate and the House in figuring out what we as a Nation are going to do about these rural areas that need drinking water and perhaps rethink this scattering of something like nine programs that do it to see if there is an opportunity to do it more effectively. We have just provided you with our slice of it.

Senator MURKOWSKI. Gentlemen, thank you for your testimony this morning. There are other questions that we have here and we will submit those to you in writing for your response. I appreciate your time in joining the committee this morning. Thank you.

With that, we will call up the second panel, Mr. Craig Bell, executive director of the Western States Water Council, and Mr. Tex Hall, president of the National Congress of American Indians.

Good morning, gentlemen, welcome to the committee. Thank you for joining us. Mr. Bell, if you would like to proceed with your testimony.

STATEMENT OF CRAIG BELL, EXECUTIVE DIRECTOR, WESTERN STATES WATER COUNCIL

Mr. BELL. Okay, thank you. The council that I represent consists of representatives appointed by the Governors of 18 Western States. We work closely with the Western Governors Association, and so we have a vital interest in the subject of this hearing. In fact, a letter was prepared by the Western Governors Association to accompany this testimony and is attached to my written statement. We commend it to you.

We think this is, of course, a very important subject as we grapple with the conditions of extended drought in the West. States in the West are the primary managers of water, and so we show keenly the impacts of the drought and have witnessed firsthand the extent of the drought over these several years now.

I remember last year, when we were visiting at a council meeting in Nevada, we went around the table and talked about drought conditions, as is our wont these years. The State engineer from Nevada remarked that things had been so dry in Nevada that he had 3-year-old fish who had not learned to swim.

[Laughter.]

That sort of summed things up in terms of how things are going in the West. Similar stories could be reflected.

We find that drought, of course, is not uncommon in the West. It is sort of the state of affairs from time to time. It is the nature of things in the West. But this drought, in particular, is of historic proportions, and part of the reason is the West has changed since the drought of the 1930's and the 1950's, to which this drought is comparable. The West has grown significantly. Growth has been phenomenal. It continues. So the challenges for the West have grown commensurately. The cities have grown. Rural communities

continue to need supplies. So the challenge has grown tremendously in terms of providing a water supply, and that of course, is exacerbated when there is a shortage, when drought occurs.

We have noticed that drought affects virtually every sector of the economy. The agricultural sector has been hit very significantly, but also the environment. There have been very detrimental effects to the environment and to many other areas of the economy. Virtually everything is dependent on water in the West, and so you can imagine that virtually every sector and interest in the West is affected when we do not have enough water.

What I thought I would focus on today is some of the effects that are not sometimes discussed. That is, we are generally aware of the economic impacts. They are in the billions of dollars and, as I say, attached to every sector of the economy.

But there are also other kinds of impacts that are not so easy to quantify. These are exemplified, as this committee knows, in situations that occurred in the Klamath River basin and the Middle Rio Grande.

Many will disagree about the factors that led to those situations. The Endangered Species Act, of course, plays a significant role. But while people will disagree about the factors that led to those situations in the Klamath and the Middle Rio Grande, I think everyone agrees that they were precipitated in large part by drought conditions, that is, there was a severe and sustained drought which led to those conditions in the Klamath and the Middle Rio Grande.

So I guess one of the things I would say is that one of the things that drought leads to in the West and elsewhere is conflict among competing uses of water. As I mentioned, cities have grown tremendously. That growth continues. But also there have been other kinds of demands that have increased, that is, demands for instream uses, for fish and wildlife habitat, for the environment, for aesthetic values. Often those values are represented by Federal laws.

So one of the things that water managers in the West must deal with is the integration of Federal and State responsibilities for water management. That is a difficult task at best. It becomes more difficult in times of drought. We saw that in the Klamath and the Middle Rio Grande.

We as the Western States Water Council, consisting of States, working with the Western Governors Association, have endeavored to provide a forum where people, State water managers in particular, could learn to integrate Federal and State responsibilities, those interests that are reflected in Federal law, as well as State law, in water in the West. But we have found that that becomes very difficult during times of drought. So that is one of the impacts that are sometimes not identified with respect to drought.

We have some ideas generated about how that might improve. We, like Assistant Secretary Raley, have found that the Federal response has been poor in terms of coordination, not because of their best efforts and intentions, but because of the nature of their authorities. There is no coordinated system for addressing drought, and we think that is a need that needs to be addressed.

We also feel that we need better information. Part of the problem is that we lack information about vital information that affects

drought, that impacts the West because of drought. That could be remedied if we could improve those programs that provide information to western water managers.

Two programs that we would single out are the U.S. Geological Survey's cooperative water program and the Natural Resource Conservation Services snow survey program. Both those programs provide vital information, especially in terms of drought. And we hope the Congress might give them appropriate attention as they are asked to make decisions about the budget for those programs. They are of vital interest to the West.

Lastly, I would commend to the Congress support for passage of S. 1454, the Drought Preparedness Act of 2003. The letter from the Governors that you will find is to that effect. We think that it has much to commend it. We think that would offer a number of things that would be helpful in preparing for and responding to drought. It would get us away from this ad hoc, fragmented approach to drought to a proactive approach that relies on preparedness as much as response. It would help deliver more effectively current drought programs at the Federal level. It would provide new tools for drought planning and preparedness, relying on existing processes and watershed councils, and it would also establish a national integrated drought information system, a bill that would create a vastly improved drought monitoring and forecasting system.

In other words, in summarizing my statement, I would say that the drought preparedness bill, as fashioned by members of this committee and others, would help us not only improve our ability to respond to emergency conditions but also to manage water in the West more effectively and efficiently. It would provide us leverage to deal with this greater problem of water supply for the future.

Thank you for your time.

[The prepared statement of Mr. Bell follows:]

PREPARED STATEMENT OF CRAIG BELL, EXECUTIVE DIRECTOR, WESTERN STATES WATER COUNCIL

My name is Craig Bell. I am Executive Director of the Western States Water Council (the Council). The Council is comprised of representatives appointed by the governors of eighteen western states. The Council has been charged with fostering interstate cooperation in water resources and protecting vital state prerogatives with regard to the management of water resources in the West. In so doing, we are a formal affiliate and work closely with the Western Governors' Association (WGA). Both organizations have followed closely drought conditions over the past five years, examined the impacts of these conditions, and have formulated proposals to help the West strengthen its capacity to cope with such conditions.

In preface to my statement, I wish to join the WGA in commending the Committee for holding this hearing. As you know, and as the testimony at this hearing will confirm, the impacts from the drought in the West—and across the Nation—have been enormous. I further wish to express appreciation for this invitation to participate at the hearing. States in the West continue to play the pivotal role with regard to water management. Given that role, states are acutely aware of the impacts of the significant drought conditions that have plagued the West in recent years. These impacts include low water supply conditions, leaving many localities to request or require water restrictions, low well levels or dried up wells, widespread record or near-record low stream flows and dismal snowpack in many parts of the West, devastating wildfires, and billions in losses to the agricultural sector, to the environment (endangered species, water quality, soil erosion/degradation), recreation, tourism, and energy, to name some.

This year has brought some relief, but precipitation has not been sufficient to ease drought conditions in many core drought areas, where significant moisture deficits have built up over the past several years. According to NOAA's Climate Prediction

Center, some improvement through May can be anticipated, and some impacts are likely to ease. "However, deficient precipitation has impacted much of this region . . . from the Rockies to the West Coast states . . . for several years now, and accumulated long-term deficits remain quite large in many areas, equaling more than a typical year's worth of rainfall in some places," according to the most recent Drought Monitor, an interagency report (on March 4, 2004). It is important to note that it will likely take substantial above normal precipitation for an extended period before the West can recover from the current multi-year drought.

In the arid West drought is not uncommon and significant fluctuations in water supply are the norm. Nevertheless, the current drought is of major proportion. Further, the West has changed significantly since the droughts of the 1930s and 50s, with which the current drought is comparable. The West is no longer a predominantly rural area, but the most urbanized in the country. While growth is occurring throughout the West, much of it is occurring in the West's urban centers.

In 2000, the estimated population for the seventeen western states, plus Alaska and Hawaii, stood at over 90 million with accompanying demands for food, fiber and power. In addition to many rural communities, cities across the West have entered the new millennium with an old challenge—finding the water necessary for present and future uses.[1]

As a result, cities exercise more influence regarding water allocation, particularly in time of drought. Further, public support has increased significantly for instream values, water for fish and wildlife habitat, recreation, and aesthetic values. Many of these values are represented by various federal laws which must be considered as part of the responsibilities of state water managers in allocating this precious resource. Thus, the job of water managers in the West is becoming increasingly challenging. This challenge is substantially exacerbated during times of drought. Water scarcity—in the face of increasing demands—has led to growing conflicts between and among different categories of water users. Two examples may be illustrative.

I'm sure everyone here is aware of what happened in the Klamath River Basin in 2001. Water to the Klamath Project was shut off under the auspices of the Endangered Species Act, after biological opinions by the National Marine Fisheries Service and the United States Fish and Wildlife Service determined that low water levels in the basin were threatening endangered sucker fish and threatened Coho salmon. As the head of the Oregon Water Resources Department said recently: "While it may be argued that these [federal] laws just 'overlay' but do not displace state water allocation primacy, there is no question that they have yet to be seamlessly integrated into state allocation systems and thus have fueled the conflicts. . . ." He further categorized the 2001 Klamath Project water supply cut-off as perhaps "the best example of a chaotic, inequitable, lose-lose outcome in Oregon. As a result, Klamath farmers lost water and livelihoods; wildlife refuges lost water and biological functions; tribes lost support for habitat improvements and reservation land restoration; government agencies lost credibility and partnerships; and conservation interests lost support for a species recovery and the ESA. Time, energy and money were diverted from the resource restoration mission and needlessly expanded in the combat."

In Oregon and elsewhere in the West, efforts are being made to better integrate and coordinate state and federal environmental and resource management laws. But this challenge is made significantly more difficult in the presence of drought. While many may argue about the factors that resulted in the Klamath Project disaster, everyone agrees that a substantial contributing factor was the drought with about 55% of normal precipitation.

A federal district court judge in New Mexico likewise ordered reductions last year in deliveries to traditional water users to preserve the endangered silvery minnow. While subsequent actions precluded this action from taking place, it underscored not only the complexity of the task of integrating federal and state laws relating to water resource management in the West, but also the impacts of drought. The Middle Rio Grande had experienced severe drought conditions leading to the federal judge's unprecedented order. The merits of that order, as well as other factors associated with efforts to preserve the habitat of the silvery minnow, have been and will continue to be debated. However, no one debates that the situation was precipitated in large part by significant and extended drought conditions. In this way, drought, in addition to causing direct economic impacts to various sectors of the economy, exacerbates the difficulty of efforts to integrate appropriate federal and state responsibilities throughout the West.

Notwithstanding the difficulty, state water resources agencies have taken many innovative steps to facilitate the movement of water from areas of relative abun-

[1] *Western States Water*, Issue #1338, January 7, 2000.

dance to areas where water is more scarce during times of need. Sometimes such actions have been taken on a temporary basis, in response to drought or other emergencies, while other changes in the nature of use have been made permanent. During times of drought, when surface waters are even more scarce, water users of all types seek different alternatives. Some can access ground water reserves less vulnerable to drought in the short term. Some increase conservation efforts and make do with less or simply must do without. Others may seek temporary changes in the place or purpose of use. Water moves between users on both a formal and informal basis. Many users have found the use of dry-year leases and other legal mechanisms useful in providing greater certainty during times of drought. Not all states have access to the same mechanisms. However, states can expedite permitting of temporary uses, such as wells, and temporary transfers among or between different users. Where necessary and possible, states facilitate emergency uses.

Ground water recharge and banking are of growing importance in leveling out temporal differences in surface water supplies. Water reuse and desalting technologies are increasing access to previously unavailable or excessively expensive alternatives. Surface water storage has long proven its benefit to the West and continues to do so during these times of drought. Of note, a Western States Water Council survey of state needs for the Western Water Policy Advisory Commission in 1996 identified an almost universal need for more water storage. While the economic and environmental costs of major new surface water storage dams and reservoirs is often prohibitive, new projects have been built, sometimes privately, to secure public water supplies.

In this context, the Western States Water Council serves as a forum for ongoing efforts to try to integrate state water rights law and administration of that law with federal reserved rights and the requirements of federal environmental laws. In so doing, the Council has actively and consistently supported adequate funding for state and federal water resources related data collection and dissemination programs. This information is vital and even more important during drought when decisions regarding the use of available waters are especially critical. Decision makers remain hobbled by a lack of sound data in many areas sometimes stumbling towards necessary actions in response to drought and other instances where water uses must be balanced with supplies. Many state and local agencies are cooperators in federal water resources data collection and analysis programs. Two of particular importance to state water administrators are the U.S. Geological Survey's Cooperative Water Program and the Natural Resources Conservation Service's Snow Survey Program.

The latter a few years ago was almost in ruins, due to flat federal funding in the face of ever increasing costs. The Congress, with the urging of the Council, added a small amount (about $2.5 million) that went a long way towards rehabilitating aging information collection infrastructure in order to keep this irreplaceable data available for myriad water users and decision makers. Still, internal agency budget restructuring and accounting for federal employees benefits sometimes threatens adequate continued funding. Similarly, the USGS Cooperative Water Program and other water programs face continual cost increases that are sometimes beyond their control and flat federal funding that has led to a long-term decline in the quantity and quality of data on streamflows available to decision makers. State and local agencies under the Coop Program now fund two-thirds of what was once a 50%-50% federal matching program, and many streamgages have been abandoned, including irreplaceable gages with over 30-years of continuous data monitoring, due to increasing costs and a lack of federal funding. Given the myriad federal and non-federal users of this data the cost-benefit ratios can be impressive. A study of the NRCS Snow Survey program in 1979 estimated the cost-benefit ratio to be around 30-1. Clearly this is a wise investment of federal funds that provides national benefits, and critical information, particularly during drought.

Without sound information on snowpack, rainfall, streamflows, soil moisture, ground water, reservoir levels and other climatological and hydrological data, decision makers cannot take the most effective actions in planning, mitigating and responding to drought and its impacts. Indeed, reliable water data is crucial to all aspects of decision making, and so we also hope that, as Congress considers the budget, it will recognize the serious need for adequate and consistent federal funding to maintain, restore, modernize, and provide for targeted expansion of NWCC's SNOTEL System and Soil and Climate Analysis Network (SCAN), and USGS's Cooperative Stream Gaging Program and National Stream Information Program, with a primary focus on coordinated data collection and dissemination.

Also, of note, the Western States Water Council is working under the auspices of the Western Governors' Association with numerous federal agencies towards a National Integrated Drought Information System (NIDIS), under a NOAA grant, to

make the best use of existing information and related programs. A draft report is being circulated for public review and comment. As part of this effort, it has been recognized that there is no integrated system for the reporting of much of the information available on drought impacts. Moreover, while there is considerable data collected on economic impacts, particularly agricultural impacts, there is less information on the environmental and social impacts of drought. Much of what has been gathered is necessarily anecdotal and is generally compiled long after the drought has passed. The NIDIS effort is looking into ways of better identifying, assessing and reporting such impacts.

Lastly, despite the enormous impacts of drought, as the attached Governors' letter notes, ". . . there still does not exist a permanent national policy to prepare for and respond to drought disasters. This lack of a coordinated, integrated federal drought policy causes confusion at the state and local levels and results in actions being taken mainly through special legislation and ad hoc measures, rather than through a systematic and permanent process, as occurs with other natural disasters that fall under the Stafford Act."

I therefore wish to reiterate the Council's and the Western Governors' support for passage of S. 1454, the Drought Preparedness Act of 2003. The Domenici-Baucus-Bingaman bill would move the country away from costly ad hoc approaches to drought response in favor of proactive preparedness, improve delivery of federal drought programs, and provide new tools for drought preparedness planning, building on existing water policy and watershed planning processes. Through establishment of the National Integrated Drought Information System, the bill would create a vastly improved drought monitoring and forecasting system.

By helping the West, and other parts of the nation, to improve the ability to prepare for and respond to drought, I believe the benefits of the Drought Preparedness Act would accrue beyond improved response to emergency conditions. By helping us mitigate the impacts of drought though cooperative planning and action, the West would be better prepared to respond to the ongoing challenges of this arid region. In other words enacting this legislation would strengthen our capacity generally to manage water resources for the future, and avoid the debilitating conflicts exemplified by the situations in the Klamath and Middle Rio Grande basins.

Thank you again for the invitation. I would be happy to respond to any questions.

Senator TALENT [presiding]. Thank you, Mr. Bell.

The next witness is Mr. Tex Hall, who is the president of the National Congress of American Indians. Mr. Hall.

STATEMENT OF TEX G. HALL, PRESIDENT, NATIONAL CONGRESS OF AMERICAN INDIANS, AND CHAIRMAN, MANDAN, HIDATSA AND ARIKARA NATION

Mr. HALL. Thank you, Mr. Chairman and Senator Dorgan. Thank you for giving me an opportunity to testify at today's hearing. I would like to submit my written statement and two NCAI resolutions for the record.*

Senator TALENT. That would be great.

Mr. HALL. Thank you.

It is the National Congress of American Indians position this morning that water issues threaten the health and future of Indian tribes, communities, and families across the West, and in many parts of the country, there is a lack of cooperation amongst the Federal, State, and tribal governments over water issues.

It is also our position and my duty as president of this organization to stand up for the water rights of Indian country. The drought we know that has gripped the West is a national problem. We have heard today of the terrible scourge this has placed upon our western communities and States and tribes, but if this problem is national in scope, then the solution must be national in scope as well.

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*The resolutions have been retained in committee files.

First of all and foremost, I would like to recognize that water is a sacred right of Indian tribes and an integral part of our culture, and in establishment of the reservations, tribes were located along their rivers. So water is necessary to sustain our life on our reservation communities today, especially when many of our reservations were established in the most desolate, remote areas of the Western United States. So, obviously, if tribes do not have water to sustain their members and their economies, the land base that was provided to us becomes basically worthless.

The Federal Government must acknowledge the seniority of Indian tribes' reserved water rights and that it has a Federal trust responsibility to ensure that adequate water resources are maintained for Indian tribes to sustain themselves on reservations. Federal law needs to impose the highest trust duties of the highest standards on the United States and require the United States to take all actions necessary to protect and maintain Indian water rights. Federal law requires a measurement and preservation of tribal water rights that will provide enough water for the present and future homeland needs of the tribes.

And as we know, the U.S. Supreme Court has upheld this as law, and that said, I find it sadly ironic that tribes are now the most vulnerable group of people due to the drought. This committee must recognize and ask yourself why is it that tribes, those with the most superior water rights, are the first to suffer when drought hits and suffer most in these times. I cannot help but wonder out loud if this country's water laws and policies will not make Indian tribes an endangered species.

Tribes must be placed on an equal footing with the rest of the Nation. I believe it is time that the United States recognize tribes' superior rights to water in this country and fund tribes at levels that will allow them to sustain and protect our economies and uphold our superior water rights, enable us to provide safe drinking water for our members that are enjoyed by many communities surrounding us today.

I would like to briefly tell you about the drought that is affecting our tribes along the Missouri River basin. The protection and management of tribal water and land resources in the Missouri River watershed are among the most critical priorities facing the 28 Indian tribes within the Missouri River basin. These tribes are geographically distributed from headwaters in Montana to the mouth of the Missouri River in Kansas and Missouri and control more than 15 million acres of land within this watershed. Despite their proximity to this great body of water, they feel the effects of the drought. Especially those tribes located on the upper Missouri River basin are in danger right now.

Obviously, the drought has a negative impact on our entire communities for drinking water, for livestock, for crops, but it also has a negative impact, in turn, on our cold water fisheries and recreation in these lakes.

We do not feel that the U.S. Army Corps of Engineers is effectively managing the upper basin lakes, including Lake Owyhee and Lake Sacagawea during this time of drought. The Corps is discharging so much water from these lakes, that these lakes and the reservoir are at their lowest levels in the last 50 years. The low

levels of these lakes are critical and are threatening our drinking water supplies.

In January this year, the town of Parshall, North Dakota, on the Fort Berthold Reservation had to have an emergency pipeline built so that they could continue to draw water from Lake Sacagawea to provide drinking water for that entire community. A permanent fix is needed and it is estimated that a permanent fix will cost $3 million to $4 million.

Just last week, the town of Garrison, North Dakota, which is located right next to Garrison Dam, experienced a water supply emergency. Full funding for Garrison diversion projects that allow for continued development of critical municipal, rural, and industrial water projects on our Indian reservations is needed badly.

We have not been fully compensated for the effects of six mainstem dams that were built along the Missouri. So even though the Dakota Water Resources Act is an authorization act passed in the year 2000, we are still waiting for adequate appropriations dollars for our tribe and all of the tribes along the Missouri basin to fully fund their drinking water systems to be established, and that will take millions of dollars.

So the bottom line on this is we feel that legislation needs to be enacted to protect the drinking water rights of tribes. We feel this is a human rights issue, that access to drinking water is not provided for our Indian communities. This should be the first priority for us.

We can continue on with other regions of the country. In New Mexico, the Rio Grande, Pueblos being deprived of valuable water supplies. We could talk about the California tribes, the Bishop, Big Pine, and Lone Pine Paiute tribes of Owens Valley, California suffering devastating loss to plant and animal life and also in the Columbia basin. When nearly 7 percent of tribal homes continue to lack running water, a figure that is 14 times higher than the national average, and in the EPA region 9 alone, which encompasses the Western-most Indian tribes, an estimated 68,000 tribal homes lack access to safe drinking water. This figure includes the 40 percent of the families on the Navajo Reservation that must haul or otherwise obtain their drinking water from unregulated resources. So based on the EPA needs survey, it is estimated that drinking water system construction and rehab and upgrades in Indian country are estimated between $350 million and $500 million.

I realize my time has run out, so I will conclude my comments and be prepared to answer any questions that you may have.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF TEX G. HALL, PRESIDENT, NATIONAL CONGRESS OF AMERICAN INDIANS AND CHAIRMAN, MANDAN, HIDATSA AND ARIKARA NATION

INTRODUCTION

Chairman Domenici, Ranking Member Bingaman, and members of the Committee, thank you for your invitation to testify today on the devastating impact the Western drought has had on Indian tribes. It is the NCAI's position that through cooperation and collaboration between the federal, state, and tribal governments, the impact of the drought can be alleviated. The most important need we have is for increased funding that will strengthen the abilities of these governments to enhance infrastructure and programs, and adhere to well-established principles of federal law. However, I want to make it very clear that it is also the position of the

NCAI that this funding must not come from the already dwindling Bureau of Indian Affairs budget or existing programs.

THE DROUGHT'S IMPACT ON INDIAN TRIBES

Indigenous people have experienced natural drought cycles for thousands of years. In modern times however, these natural drought cycles are extremely exacerbated by the inappropriate management of scarce water resources. As I am sure you are aware, the Indian tribes of this country are very diverse in culture, geography, and economy. As such, the drought has impacted the tribes in very different ways. For agrarian cultures it means reduced farm crops or modifying farming practices. For fishing cultures it could mean a stressed fishery that forces tribes to modify their harvests. However, in the case of the present water crisis, Indian tribes have already altered their practices to accommodate for the lack of water resources. It has been through the action or inaction of the federal or state governments that Indian tribes have been affected. I want to share with you specific instances of how the Western drought has had a profound impact on Indian tribes throughout the region.

In northern California, drought has brought out the worst-case scenario of water allocation at the expense of the Tribal fisheries in the Klamath Basin. The federal government's water management practices over the past century have taxed the federally reserved fishing rights of tribes in the region, culminating in devastating effects on both the tribes and the surrounding agricultural community. The upper Klamath Basin historically was an arid region, yet development of irrigation and reclamation projects have created a non-sustainable situation of producing crops such as potatoes and alfalfa that require high volumes of water. Likewise, on the Trinity River, a major tributary to the Klamath system, water has been exported out of the basin for decades causing a stressed fishery and over-dependence by agriculture. This development contributed to the many factors causing the decline of tribal fisheries and the eventual listing of several fish species on the federal endangered species list. Drought in 2001 forced the federal government to curtail irrigation deliveries in order to uphold its responsibilities under the Endangered Species Act. Political backlash to this decision in the following drought year contributed to curtailed river and lake levels resulting in a tragic unprecedented fish kill of over 35,000 adult salmon. This massive fish kill was devastating to the Klamath Basin tribes, specifically the Yurok Tribe.

In New Mexico, the Middle Rio Grande Pueblos are being deprived of valuable water needed to continue traditional farming and related ceremonies due to the drought. This deprivation not only threatens the Pueblo economies and social structure, but also the very basis of traditional Pueblo lifeways. Because the Rio Grande has been seriously over-engineered with many dams and reservoirs, the federal and state governments have been required to enforce senior water rights in accordance with the prior appropriations system. They have had to resort to this strict enforcement in order to protect the silvery minnow, which is listed as an endangered species. Despite the Pueblo's senior water rights, many traditional farming families are not able to use their lands for subsistence farming because of a lack of available water. The Pueblos should not be deprived of water at the expense of the silvery minnow. Under well-established principles of water law, the federal and state governments must apportion the water based on seniority. The Pueblos should be the first entity to receive what they need to continue their existence as self-sustaining subsistence farmers and carry on their traditional ways of life.

The Bishop, Big Pine, and Lone Pine Tribes of Owens Valley, California have suffered devastating loss to plant and animal life in their tribal homelands due to the drought. Owens Valley is on the east side of the Sierra Nevada Mountain range, which supplies the City of Los Angeles with approximately 70% of its drinking water which comes from run-off and groundwater pumping. Last year, the City of Los Angeles Department of Water and Power (LADWP) pumped over 86,000 acre feet of groundwater from the Owens Valley. This tremendous amount of groundwater pumping—coupled with current drought conditions—has resulted in increased adverse impacts on tribes in the Owens Valley. The tribes in the Owens Valley are in desperate need of financial and technical resources to monitor the water tables and vegetation status to ensure that conditions do not further deteriorate.

In Arizona, traditional Hopi farmers are known to grow beautiful, bountiful crops even in the driest of climates. However, recently, Hopi tribal farmers have witnessed a dramatic decrease in productivity and sustainability of their crops. The canyon country of the Colorado Plateau is currently suffering from one the most severe, prolonged droughts in history. The drought, coupled with the draining of the Navajo Aquifer (N-Aquifer), is threatening the ancient farming traditions of the Hopi people. Also in Arizona, the White Mountain Apache Tribe has been affected

by the wildfires in the White Mountains. The fires significantly impacted this Tribe's economic viability since forestry is a major source of revenue for the Tribe.

In my home State of North Dakota and all along the Missouri River Basin in Montana, South Dakota and Nebraska, the protection and management of tribal water and land resources in the Missouri River watershed are among the most critical priorities facing the twenty-eight basin Indian tribes. Indian tribes control more than 15 million acres of land within this watershed, geographically distributed from the headwaters in Montana to the mouth of the Missouri River in Kansas and Missouri. Yet despite their proximity to this great body of water, the Standing Rock reservation ran out of water this year because of mismanagement of the Missouri River Basin. The drought that has gripped the northern Plains has given us record breaking high temperatures year after year, and resulted in a greatly reduced snowpack in the Northern Rockies that drastically reduces stream flows all along the Missouri River. North Dakota has been operating under a Drought Emergency Proclamation issued by Governor Hoeven since 2002. The drought directly impacts tribal members' livestock, crops, and is threatening the health of the cold water fisheries in Lake Sacagawea. In January, the town of Parshall on the Fort Berthold Reservation had to have an emergency pipeline built just so they could continue to draw water from Lake Sacagawea, but will need a permanent fix that will cost $3 to $4 million dollars.

Despite historical and legal rights to the water, Missouri River Basin tribes have been excluded from the benefits of the Missouri River water resources and its tributaries. Twenty-three percent of the 1,499,759 acres taken for the construction of the dams and reservoirs under the Pick-Sloan plan were Tribal lands. More than 350 families—1,700 from my Tribe alone—were relocated because of the flooding caused by the Garrison Dam. Although the federal government promised irrigation development and participation in electricity generation over fifty years ago when these lands were taken, the Tribes are only now beginning to receive some of these benefits. The Mandan, Hidatsa & Arikara Nation never received the 20,000 kilowatts of free power we were promised nor did the United States ever rebuild the hospital we lost, a promise that was made over 50 years ago. My grandfather was Vice Chairman and present at the signing of agreement in 1948 that took away our lands so I have a strong personal commitment to seeing that the United States honors its word. The flooding caused by the Dam took away so much. It was more than just the land—it was the language, it was the culture, it was the history. It was more than just a simple flooding. Although our reservation was promised $70 million in water development projects, my tribal members still must haul their drinking water. We now estimate it will take $86 million to provide adequate drinking water throughout the reservation, but funding when it comes seems like it is only a few dollars at a time.

The tribes seek meaningful participation in resource management within the Missouri River Basin, but lack the resources to do so. Our tribes' natural resource and water resource offices depend on discretionary funding from federal agencies for maintenance of their operations. Like most tribal programs throughout Indian country, they derive the bulk of this funding from the Bureau of Indian Affairs and other governmental agencies, with annual funding priorities mandated by Congress. The tribes are vulnerable to annual fluctuations in federal funding, which inhibit long-term planning. Congress should also appropriate full funding for Garrison Diversion projects that allow for the continued development of critical municipal, rural and industrial (MR&I) water projects on our Indian Reservations.

LEGAL BACKGROUND

Federal law requires a measurement of tribal water rights that will provide enough water for the present and future homeland needs of Indian tribes. The United States Supreme Court has long held that federal Indian reservations were set aside as permanent homelands for Indian people to live upon in a self-sustaining fashion into the indefinite future, with enough water reserved for tribal use now and for all the future generations.

In the landmark case of *Winters* v. *United States*, 207 U.S. 564 (1908), the United States Supreme Court held that Congress by creating the Indian reservation, impliedly reserved "all of the waters of the river necessary for the purposes for which the reservation was created." *Winters*, 207 U.S. at 576. The Court further declared that this reservation of water was not only for the present needs of the tribe, but "for a use which would be necessarily continued through the years." *Winters*, 207 U.S. at 577.

This principle outlined in Winters is now well-established in federal water rights jurisprudence: the United States, in establishing Indian or other federal reserva-

tions, impliedly reserves enough water to fulfill the purpose of each federal reservation, including the residential, economic development, and governmental needs of Indian tribes. See *Arizona* v. *California*, 373 U.S. 546, 599-601 (1963), *Cappaert* v. *United States*, 426 U.S. 128, 138 (1976); *United States* v. *New Mexico*, 438 U.S. 696, 700 (1978); *In re The General Adjudication of All Rights to Use Water In the Gila River System and Source*, 35 P.3d 68 (2001). Importantly, this type of federal reserved water right is "superior to the rights of future appropriators." *Cappaert*, 426 U.S. at 138.

Not only must the federal government acknowledge the seniority of Indian tribes' reserved water right, it also has a trust responsibility to ensure that water resources are maintained for the Indian tribes. Federal law imposes trust duties of the highest standard on the United States that require the Department of Interior to take all actions necessary to protect and maintain Indian water rights. The United States Supreme Court has long held that, as Indian tribes' trustee, the United States must act to "preserve and maintain trust assets," using "reasonable care and skill to preserve trust property." *United States* v. *White Mountain Apache Tribe*, 123 S.Ct. 1126, 1133-34 (2003). See also *United States* v. *Mitchell*, 463 U.S. 206 (1983). These trust duties require protection in circumstances such as ours where "water rights constitute the trust property" which the federal government has the duty to preserve by performing "all acts necessary." *Fort Mojave Indian Tribe* v. *United States*, 23 Cl. Ct. 417, 426 (1991). Failure to comply with these federal trust duties will result in a monetary award against the United States for breach of trust.

As the Supreme Court recently explained, the United States' federal trust duties are substantial when the United States exercises direct control over tribal trust assets on a daily basis. In such circumstances, "a fiduciary actually administering trust property may not allow it to fall into ruin on his watch." *White Mountain Apache*, 123 S.Ct. 1126, 1133. Since the Department of Interior has direct control over the manner in which tribal water resources are maintained, utilized, and managed, it is the Secretary's responsibility to protect tribal use of those waters. Additionally, she has the trust obligation to take the affirmative steps necessary to settle and permanently protect tribal water rights in a comprehensive manner. In all of the examples that I gave you of how Indian tribes are affected due to the Western drought, in every instance, the federal government has had the duty and obligation to protect the Tribe's interest and ensure use for future generations. In these examples, the federal government has breached that duty by allowing diversion of water for non-Indian and commercial use, apportioning the water to protect an endangered species, not consulting with the affected tribes, and neglecting to adequately fund the tribal environmental programs needed to ensure healthy, sustainable communities.

WATER INFRASTRUCTURE

Nearly 7% of tribal homes continue to lack running water, a figure that is 14 times higher than the national average. In EPA Region 9 alone, which encompasses the westernmost Indian tribes, an estimated 68,000 tribal homes lack access to safe drinking water (including 40% of the families on the Navajo Nation that must haul or otherwise obtain their drinking water from unregulated sources), and there is only a 50% certainty that a tap turned on in a tribal home will consistently produce water in compliance with bacteriological monitoring and testing requirements. Based on the EPA Needs Survey, it is estimated that drinking water system construction and rehabilitation and upgrade needs in Indian Country have been estimated to be approximately $350-$550 million.

Lack of funding for operations and maintenance for the continuing health and welfare of the tribal public water system is also a major concern for Indian tribes. The Western drought puts pressure on resources available to public water systems, thus implicating the funding for tribal water infrastructure needs. Routine water quality monitoring and operation and maintenance activities are absolutely essential to ensure the continued safety of drinking water in Indian country. Additionally, the absence of financial, managerial, and technical capacity often results in violations of the Safe Drinking Water Act and puts the public health at risk.

New federal requirements for drinking water protection, solid waste control, nonpoint source pollution abatement, and hazardous waste have affected Indian reservations. Tribes have been charged with implementing these legislative regulations and rules with inadequate federal funding. The tribes stand ready to take the lead in the development of these codes and regulations, but need the critical skills to carry out these programs pursuant to federal laws. Such skills include sound technical capabilities and administration, policy, and managerial skills.

SOLUTIONS—THE ARIZONA WATER SETTLEMENTS ACT AS AN EXAMPLE

Under well-established principles of federal water law, Indian tribes hold senior, federally reserved water rights that must be fulfilled before water is allocated to junior users such as municipalities and non-Indian farmers. These rights must be acknowledged and adhered to by the federal and state governments. One way of acknowledging these rights is by entering into settlement with willing Indian tribes in order to have water claims finally adjudicated. These adjudications will also clear up the confusion surrounding the delivery of water during times of drought in the future.

The Arizona Water Settlements Act is pending before your Committee to resolve permanently the water rights claims of the Gila River Indian Community. As you are aware, the quantification of rights to water and development of facilities needed to use tribal water supplies in an effective manner is essential to the development of viable Indian reservation economies, particularly in arid western States. Importantly, S. 437 recognizes the need to find sources of funding for Indian water settlements, and the construction of tribal water delivery systems authorized by those settlements, outside of the Bureau of Indian Affairs. In S. 437, the payments made by the State of Arizona to meet its repayment obligations to the federal government for the construction of the Central Arizona Project are deposited into the Lower Colorado River Basin Development Fund. The money will be made available directly from the Fund to tribal settlement costs, both those authorized in the bill and others such as those of the Hopi and other Arizona tribes that have not yet been enacted by Congress. This distribution will not be associated with the annual Congressional appropriations process and will not come from the Bureau of Indian Affairs budget. NCAI supports, as you do, creative approaches to funding Indian water settlements to allow Indian water settlements to be funded and bring certainty to water rights in western states without diluting the availability of much-needed BIA funds for critical Indian programs.

CONCLUSION

On behalf of NCAI, I would like to thank the members of this Committee for the opportunity to testify on how the drought has affected the Indian tribes of the West. Like federal, state, and local entities, many Indian tribes have been adversely affected by the drought. It is the NCAI's position that the impact of the drought can be decreased by providing more funding for tribal water infrastructure. Also, there is a need for an increase of funding for tribal, state and federal governmental agencies to ensure that the federal government's trust obligation is fulfilled even during these times of crisis. Settlement of tribal water claims such as the Arizona Water Claims Settlement Act are critical to creating and sustaining viable economies in Indian country and eliminating uncertainty of water apportionment during times of drought. Finally, any new funding should come from new sources and not from the Bureau of Indian Affairs budget.

Lastly, the notice I received concerning this hearing was very short and I have only given you examples of the effect of the drought on tribes that were able to respond on such short notice. I know there are other tribes that are suffering from the drought. It is my understanding that this Committee will have additional hearings on this subject and I would appreciate the opportunity to appear before you again to provide additional input to this Committee on tribes' view of the drought and water management in the West.

Senator TALENT. Thank you, Mr. Hall. Of course, your statement is in the record, and we appreciate your being here. We appreciate both the witnesses very much.

And I will recognize Senator Dorgan for any statement or questions he may have.

Senator DORGAN. Senator Talent, thank you very much. I have been attending a Commerce Committee markup all morning, so I was only just now able to arrive here.

Let me thank Mr. Bell for being here, and especially let me thank Tex Hall. We in North Dakota are very proud of his leadership. He is the National Chairman of the Congress of American Indians.

Mr. Hall, let me ask you a series of questions.

First of all, let me ask consent to put my opening statement in the record.

Senator TALENT. Without objection.

[The prepared statement of Senator Dorgan follows:]

PREPARED STATEMENT OF BYRON L. DORGAN, U.S. SENATOR FROM NORTH DAKOTA

Mr. Chairman, thank you for holding this very timely hearing on a topic of great importance: water supplies in the arid West. This is a subject on which I have been spending a great deal of time, because drought, and all of its repercussions, has hit hard in North Dakota.

We have had a water supply crisis in my state. Over the last year, due to drought conditions and the mismanagement of the reservoirs on the Missouri River, North Dakota has experienced severe water shortage problems. Last October, I became aware that the City of Parshall was facing the prospects of losing its water supply if something was not immediately done to extend its water intake pipes. Then, in November, Ft. Yates actually lost their water supply when lake levels became too low to supply critical water needs.

These experiences have shown there is an immediate and serious need to evaluate and address our water infrastructure needs in rural areas of our country. Notwithstanding what was done on behalf of these towns to mitigate the impact of their loss, the fact is these losses could have been avoided. The Army Corps of Engineers was well-aware of the adverse consequences that would result when lake levels reached a certain point.

I look forward to hearing from the witnesses on this important topic. I am particularly pleased that Chairman Tex Hall is here today, and we appreciate his making the effort to come to appear before the Committee. Again, Mr. Chairman, thank you for conducting this hearing.

Senator DORGAN. Chairman Hall, do you have people on your reservation that are now hauling water?

Mr. HALL. Unfortunately, Senator Dorgan, we do. We feel between 20 to 25 percent of all tribal residents on Fort Berthold are currently hauling water. I myself, as tribal Chairman, am supposed to be considered one of the people that should not have to, but I haul drinking water every day.

Our water is of such poor quality, and the sanitation conditions many times are really challenging, especially when you are hauling water in the back of a pickup truck for those hundreds of families that are on Fort Berthold.

Senator DORGAN. And that is much more vulnerable to contamination when you are hauling water, as opposed to having water in a closed system in which the water is treated?

The reason I ask you that question is that I have sat with families on reservations particularly who describe the day-to-day requirement to haul water. People forget about this and what it means when you are actually having to go find a pickup truck or a truck and put water in a tank and haul it to your storage facility on your premises. Then the question of taking a shower or using water in your daily activities is an entirely different question because then you have to be concerned about how much water do you have, how much must you conserve, in addition to the issue of contamination.

I am surprised by the percentage you described to me. I despair at that percentage because that is a lot of families who cannot take for granted that which we take for granted every single day. Water comes out of a tap. You turn on the faucet and you get water. But having to haul water is an enormous problem for a lot of families

and we really need to find a way to address that and fix that. I know that you are working hard to do it.

Do you want to comment more on that subject?

Mr. HALL. Senator Dorgan, I would like to add the Indian country faces a higher rate of diabetes, a 7 times higher rate of diabetes than the national average. So as we are looking to dialysize patients, these same patients that we are looking for cleanliness when they get on a chair and hooked to become dialysized, those same principles are not practiced at home because they have, in many situations, unclean water and unhealthy water.

So lack of access to quality drinking water we feel is not going to turn around the negative impacts of diabetes. So our tribe and many tribes have actually declared a war on diabetes, but part of that war has to have access to quality, treated drinking water to help our people become healthy. That is something that is not going to turn around unless we can turn around access to treated drinking water.

Senator DORGAN. This may not be a great place to be talking about the management of the Missouri River because the Senator on my right lives downstream.

Senator TALENT. I was hoping, Senator, the subject would not come up until you had left, and then I could rant and rave on behalf of Missouri.

[Laughter.]

Senator DORGAN. So anticipating his ranting and raving, let me get in front of it just a bit. Mr. Hall, have you taken a look at the proposed management of the Missouri River? The new, revised management program that the Corps of Engineers has recently released? They have talked about revising the master manual for 12½ or 13 years. They finally, after 12½ or 13 years, produced this product, which is horribly deficient in my judgment. Have you had a chance to look at it?

Mr. HALL. Yes, I have, Senator Dorgan, and we feel it does not protect the rights and the issues of a higher lake level for tribes to have access to those water systems. If we were to look at a chart in the Bureau of Reclamation—our tribal water directors could provide that—of all of our communities that are located—of course, indigenously our people always lived by the river, and so now communities are by the river. So when that lake level drops—and of course, we do not believe the new master manual addresses that issue—there are going to be entire communities without water, as we have seen with Standing Rock and Fort Yates, an entire community without water and now Garrison without water.

The solutions are temporary and that does not address the permanent need to fix these, but part of the solution has to be to provide more water in the upper basin in order for us to use the lake and use the river like we always have, since the beginning of time and before the Army Corps of Engineers managed the lake. So we do not think it really addresses our concerns.

There will be more money spent on the back end trying to fix crises instead of trying to fix it on the front end. So I agree that the manual is deficient and we are going to have more families and more communities entirely without water that is going to cost a lot more money later on.

Senator DORGAN. Well, the revised manual is really almost irrelevant. It does not really make any substantive changes that addresses the upstream States' interests, in my judgment. I guess I am probably not very surprised by that, but I am very disappointed in it.

What has been the economic consequences to your tribe in North Dakota, the three affiliated tribes, with respect to recreation and tourism and all the other things that relate to the loss of boat ramps and the declining level of the reservoir?

Mr. HALL. It is in the millions, Senator Dorgan. Of course, the lake and the river are right between our million-acre reservation, as you know. In western North Dakota, we are very rural and we depend on recreation and fishing. Last summer—and it is not going to get any better for this year and for next year and the year after that. The majority of recreation sites have lost access with their boat ramps because of the droppage.

So we are scrambling now to find the ramp that would be most cheaply fixed to make an adjustment to have access to the water because if you do not, the fishing industry is going to dry up, and that is a multi-million dollar industry for our reservation and for the entire State, as you know. So that really has a potentially devastating effect on our economy. People will not come to the hotels. They will not come to the stores, and there is going to be a huge loss of industry and local businesses are simply going to go out of business and go bankrupt.

Senator DORGAN. There is less water in the Missouri River system. There is less snowpack and going to be less coming into the system again this year. We understand when the Corps of Engineers says we have to make do with less and therefore the reservoirs are drawn down. But that is a question that is separate from how you manage the river and how much you release from the reservoirs. My own view is that the Corps of Engineers has fumbled this miserably.

In North Dakota, as you know, Chairman Hall, over 7,000–8,000 citizens on the Fort Yates Reservation during Thanksgiving week lost their supply of water. Parshall would have lost its water last month, in the month of February, were the intake not extended by the Bureau or had it not been extended.

So we have some very significant challenges. One can hope that we get through this drought period and see more water enter the system, but even when that happens, we still need a reasonable management scheme for the Missouri River system.

Your reservation is a very large reservation geographically and it is intersected by the reservoir and the river system. My father, when he was a young man, herded horses and lived in Elbow Woods, North Dakota. Elbow Woods no longer exists. Elbow Woods is under a reservoir, so it is a town that is now gone.

From that experience, the members of your tribe especially, but others as well, have been displaced, moved to higher ground. Their diets changed. They developed diabetes. I held a hearing on your reservation and the rate of diabetes on your reservation is 12 times—not double, triple, or quadruple—12 times the national average. It is devastating. As you said, the issue of water and the re-

quirement to haul water is completely counter to what we need to be doing to address the health needs of those with diabetes.

So your testimony is very helpful, Chairman Hall, and again we are very proud of your national leadership. We have a lot to do not just on this committee but on the Indian Affairs Committee, on which I serve, and also the Interior Subcommittee of Appropriations where we actually appropriate the money for all of these Indian programs. I think your leadership is going to be instrumental in our trying to address these in as thoughtful a way as we can.

Did you have any other comments about the Missouri River system? I know that you have consulted the chairman of the Standing Rock Sioux Tribe with respect to their intake issues as well.

Mr. HALL. Senator Dorgan, thank you for the question, for the follow-up. I would just like to say it is the first time I have heard of the Department of the Interior's plan for Water 2025, and I have not heard tribes mentioned in 2025. The Department of the Interior should know they have a trust responsibility to tribes. That land is held in trust and because of the treaty obligations and the allotments from the Dawes Act in 1887 and the Winters doctrine of water rights established in 1932, they clearly have a trust responsibility. It disturbs me that we are not mentioned in Water 2025.

So I would also further ask the committee that tribes need to be involved if there are further hearings down the road to make sure that our issues are being addressed in this proposed Water 2025 or any Federal policies regarding water issues.

Senator DORGAN. Let me just say on that point we have had this dispute with the Corps and others about Indian water rights. You have Indian water rights that exist. They are not quantified and they should be, but they nonetheless exist. I do not think there is great debate about that. It is not sufficient for the Corps simply to say that we consulted because they told you what they were doing, and that is too often the case. There needs to be full consultation with respect to tribes because those tribes have inherent water rights that exist in law. They are not, in my judgment, negotiable. They currently exist and I think the Corps has not done the tribes justice by their failure to consult the way they should have been consulting along the way.

So these discussions will continue as well. I know that you and the National Congress and others will be actively involved in them, and really, you must because we have discovered the Corps of Engineers tends to move in its own direction and it is pretty impervious and oblivious to other interests from time to time. We try here in Congress to give it a huge, swift kick on occasion and it seems to have almost no impact at all.

[Laughter.]

Senator DORGAN. When we have a flood, they are great flood fighters and God bless them for that. But on issues like management of the Missouri River system, shame on them for taking 13 years and then coming up with such a miserable product. We will have more to say.

Now, because I have to go somewhere else, I am not able to hear the comments from my distinguished colleague from Missouri on the Missouri River system.

We must, it seems to me, all of us, find a way to address these issues, and addressing them includes addressing the rights of Indian country as well.

Mr. Chairman, thank you for being patient.

Senator TALENT. Well, I sure thank the Senator, and as usual, he has argued his case with a vigor and an eloquence worthy of a better cause I may say, but certainly well done.

Senator DORGAN. Wait until I leave to say those things.

[Laughter.]

Senator TALENT. Let me get a couple of housekeeping details out of the way, and I want to ask Mr. Bell about the rural water bill, get his opinion on that.

The record will remain open for statements and questions for any of the witnesses until close of business tomorrow and all documents should be directed to the committee staff.

Mr. Bell, we would like to know if you have reviewed the current rural water bills currently before the committee. Do you have any comments on the current Federal programs, how well they are meeting rural community needs in Western States, and do you have any changes or improvements you want to suggest either to the bill or to current programs?

Mr. BELL. We do not have a position on the current bill. I will say, however, that we do have a consensus about greater need for meeting rural water supply needs. There is a consensus among the States that we need to do more as a country. We took a survey in connection with the study done by the Western Water Policy Review Advisory Commission, and many of our States were concerned about the situation in our rural communities. So we are very supportive of the concept at least of providing sufficient water for our rural communities. We recognize the need.

Senator TALENT. If you have anything more specific you would like to offer in writing, the committee would be glad to have it.

Mr. BELL. Thank you.

Senator TALENT. I appreciated very much the testimony of both the witnesses. Mr. Bell, if I can sum up yours, what I hear you saying is that we need to fund information collection. We have got to know where we are with water resources and water quality.

Mr. BELL. Indeed.

Senator TALENT. This is a problem, by the way, in Missouri, particularly in southwest Missouri. Missouri is an interesting State because it is like five States all coming together in one. The whole country meets in the middle of Missouri. Southeast Missouri and southwest Missouri are different, St. Louis, Kansas City. And southwest Missouri is very much like a Western State in terms of water issues. We have real supply issues there. So we certainly sympathize with what the Western States have been going through.

One of the things that we are trying to do is to get a handle on just what the situation is in the aquifers, what water quality issues are, and there is not enough good information. And that is a problem all through the West.

Mr. BELL. I agree. I certainly do.

Senator TALENT. Certainly, Mr. Hall, feel free to offer comments on any of this.

We have got to get the right information. We have got to begin emphasizing preparedness rather than ad hoc responses. I think we are all in agreement with that too.

And we need to find a way to develop an integrated approach rather than waiting until there is a crisis and then the States and localities all go off on their own trying to catch as catch can. That is going to be hard because it is going to mean—and we are all jealous of what we have got because we are worried about losing that, and agreeing to an integrated approach raises at least a specter that maybe we will not have as much control over what we have got.

That is really the problem with the Missouri River. In Missouri, we are concerned about a number of things flooding in the spring because we have so much good farmland right around the river, but we are also concerned about navigation. We have gone from 3 million commercial tons of navigation in 1980 to 1.3 million in 1990 to a little over 1 million last year. And this is bad for everybody because barge traffic is often the cheapest and certainly the environmentally most safe way of getting product to market.

I mention this because when I hear from my friends in the West on the river, it is impossible to deny the validity of the interests that you are representing. I mean, safe drinking water, tourism. Tourism, along with agriculture and agribusiness, is the biggest part of Missouri's economy. So we are all sort of fighting over this water and we all need it.

That is why it bothers those of us in Missouri when we feel valuable interests are being sacrificed not necessarily on behalf of upstream economic interests, but in order to protect, let us say, the pallid sturgeon or the least tern when the science regarding that, on top of everything else, is very dubious. You can understand I think at least how we feel about that because it is one thing to say, well, no, we have to reserve it for the economic interests upstream, but it is another thing to have a court coming in, sequeing in and grabbing it on behalf of that particular interest. And this is the integrated approach you mentioned where we all get around a table and balance these interests.

So I felt I needed to say that since Senator Dorgan raised that issue.

I really do not have a lot to add. Do you all have any further comments you want to make on that issue or any other? I will let you get the last word in. Well, maybe not on the Missouri River, but anything else.

[Laughter.]

Mr. HALL. Thank you, Senator Talent. I agree with a lot of what you said. It does need to happen and, Mr. Bell, we do need to have that integrated approach, but tribes need to be at the table because of our rights to the water and to the river. Our main concern is drinking water, access to that drinking water and protecting our rights in that regard.

On tourism, though, I will——.

Senator TALENT. Let me say, Mr. Hall, in terms of hauling water, my mom was raised on a dairy farm in Jefferson County, Missouri and was a big gardener her whole life. She always had a big vege-

table garden. And she hauled water when she was a girl. And when my brother and I would complain——.

Mr. HALL. Good for her.

Senator TALENT. I mean, she told us what it was like, and when my brother and I would complain about having to haul the hoses out and spend some time watering her vegetable garden, she would give us a lecture about what it was like when she was a girl hauling that water. So I do not know from personal experience, but I know that it is difficult. The water is not as safe, and boy, if you have not hauled water, you do not know what it entails. So I can sympathize.

Please go ahead.

Mr. HALL. I was just going to say that I appreciate your story about your mother because my father had an eighth grade education, but I say he had a Ph.D. in just everyday smarts. But he told me, make sure you go to college because I do not want you to come back and be a cattle rancher like me and have to haul water. I went to college. I came back. I am a cattle rancher and I still haul water. He told me I would be a damn fool.

Senator TALENT. My mom was German. She used to say we grow too soon old and too late "schmart."

[Laughter.]

Mr. HALL. I will be in your home State on I believe Sunday, the 13th of March, on the Lewis and Clark bicentennial.

Senator TALENT. Yes.

Mr. HALL. So I will be there to help lobby an ad for your tourism issues and to bring attention to the historic Lewis and Clark Bicentennial Trail of Discovery, 200 years ago.

Senator TALENT. And maybe in the spirit of Lewis and Clark, which all of us along the river can take pride in, that expedition, maybe we can come together on some of these water issues.

The larger issue on this information, Mr. Bell, that you raised, I increasingly have faith that technology and innovation, if we understand a problem well enough, will dig us out from under a fair amount of it if we know what the situation is and will honestly look at it. So this is it, here are our alternatives with technology, and if everybody can be at that table, we may be able to get our way out of a lot of this.

Mr. BELL. Yes. I have found so many circumstances where technology and innovation have helped us greatly in terms of these kinds of problems.

Senator TALENT. Yes. Well, I am grateful for your testimony. It has been a good hearing. Certainly you all know that the committee, whatever Senators' particular interests may be, wants to make certain that there is enough water available for everybody in the Western States, as well as the Midwestern States, if I may say so. So we are grateful that you are here today.

I have already given the announcement about further submissions for the record, so the hearing is adjourned.

[Whereupon, at 11:53 a.m., the hearing was adjourned.]

[The following statement was received for the record.]

PREPARED STATEMENT OF THE AMERICAN FARM BUREAU FEDERATION

The American Farm Bureau Federation (AFBF) is greatly interested in the issue of the future of water supplies in the West. We are pleased to submit this statement for the hearing record.

Water is the scarcest and most important resource in the Western United States. It is vitally important to the farmers and ranchers who settled the West and who provide food and fiber for the country and the world. Agricultural production depends on the timely availability of water supplies. For example, 75 percent of the total value of Colorado's $1.3 billion in agricultural crop production comes from irrigation. New Mexico produces $2.2 billion annually in agricultural products and agriculturally-related industries employ more than 47,000 people statewide.

Furthermore, the economies of most rural communities in the West are built around farm and ranch activities. No water means no local food production further eroding the economic base of many of these communities. Since the earliest days of Western settlement, a system of state-based water rights laws have been developed to meet the particular needs of the arid Western states and their growing populations. AFBF supports this system that has served the needs of this rapidly developing area while preserving water resources for a large and productive agricultural economy. State water laws have provided an orderly system for allocation of scarce water supplies.

State water laws and the availability of water for the production of food and fiber have come under attack in the West. The fastest growing area in the country, western cities and municipalities, are increasing their demands for available water. Activist organizations are using the courts to apply federal statutes such as the Endangered Species Act and the Clean Water Act to effect a re-allocation of scarce water supplies away from the holders of legitimate water rights pursuant to state water law to listed species and to instream water flows. All this is occurring in a prolonged drought that has left western reservoirs at record low levels.

Farming and ranching are crucial if the character of the West is to be maintained. Western farmers and ranchers not only provide food and fiber for the world, but they provide many other benefits as well. Often, the only thing standing between open spaces and urban sprawl is agriculture.

In 2001 over 1,400 farmers and ranchers in the Klamath Basin area of Oregon and California had their irrigation water shut off and were deprived of a crop and their water used instead for two endangered fish. A similar situation was experienced on a smaller scale in New Mexico in the Middle Rio Grande River area near Albuquerque when the Bureau of Reclamation was required to use irrigation water for the silvery minnow.

1. WATER 2025

To address these issues and to try and prevent similar situations from occurring, the U.S. Department of Interior (DOI) began an initiative it calls "Water 2025." The purpose of the initiative is to anticipate potential "hot spots" such as Klamath and New Mexico that are likely to occur in the next 20 years and plan strategies to avoid them.

Water 2025 is a comprehensive, well thought out blueprint for helping agriculture, industries, municipalities and wildlife to meet their water needs for years to come. AFBF and affected state Farm Bureaus have had significant involvement with the DOI on Water 2025.

Water 2025 contains a lot of points that AFBF agrees with. For example, we support the policy of seeking new innovative technologies such as desalination for increasing the supply of water available to westerners. It is extremely important that this technology be made affordable for the West.

We also support the apparent thrust of the initiative to preserve state water rights laws and to respect private property rights. Water is a resource that is under the jurisdiction of state law. As previously mentioned the western states have developed a process for the adjudication of water rights within the state that has served water users well for many years. It is appropriate that any solutions to water shortage issues currently facing the West should be addressed at the state level.

We also support efforts to make water use more efficient. Agriculture is doing its part. Every five years the U.S. Geological Survey (USGS) publishes a report of water use in the United States; the last report is from 1995. Irrigation application rates vary from year to year depending upon rainfall, surface water availability, energy costs, commodity prices, application technologies and conservation practices. According to the USGS, the average amount of water applied per acre for irrigation was 2.1 acre-feet, a drop from the 1980 average of 2.5 acre-feet. The amount of irrigated acres in the United States is 58 million. Irrigated acreage, according to the

USGS report, is increasing in the Eastern United States and declining in the West. Irrigated acres in the 19 Western states have declined due to urban development and the sale of irrigation water rights to municipal water suppliers.

We further support the encouragement of local solutions to local water issues. Involvement at the local level by affected parties is critical to the development of any workable water plan. "One-size-fits-all" solutions are not the answer.

Voluntary, temporary, market based water banks hold some promise to create solutions to temporary water shortages in particular areas. Such programs must be voluntary, not result in the permanent loss of water rights, and be market based.

A puzzling and glaring omission from the suggestions made in Water 2025 is the issue of additional water storage. Farm Bureau strongly believes that increased water storage is essential in order to solve many of the water issues in the West. Demand for water continues to increase and the rising demand cannot be met without additional supplies.

States such as Colorado and Montana are headwater states, meaning that their water generally runs through rivers and streams to other states. Colorado, for example, is entitled to the use of more water than it is currently able to capture. Additional storage is vital for Colorado to meet the rising demand from Denver and its environments.

Additional water storage will not only allow for states to meet the needs of their residents, but it will provide a measure of certainty in times of drought. New storage facilities will bring water supplies to areas that need it most. Additional storage can occur in non-intrusive ways and could mean new dams and reservoirs, adding a foot to existing reservoirs in order to increase capacity or underground water storage. We urge the committee to consider additional storage as a possible solution to the water crisis in the arid west.

Another issue that in theory sounds good, but has some practicality concerns is making canals and delivery systems more efficient. For example, lining canals would result in less water being lost allowing for more water to be available for other uses. The practical application is not that easy. Water return flows resulting from such leakage is very important for agriculture. Additional water rights are derived from return flows, and many farms, ranches and other enterprises depend on such return flows. Making canals impervious to water loss will decrease these return flows, causing economic harm to a lot of farmers, ranchers and others.

Many rivers and streams across the West are lined with salt cedar or other water draining vegetation. One salt cedar, for example, can consume upwards of 200 gallons per day. These plants spread rapidly, drying up rivers and streams. We are pleased that the DOI and Department of Agriculture have embarked on an aggressive campaign to remove salt cedar from western waterways. A successful control program will not only make more water available, but will also address an invasive species problem.

2. MISSOURI RIVER WATER FLOWS

Agriculture needs the continuing operation of the Missouri River for the purposes of flood control, navigation, irrigation and hydropower production. Management of the Missouri river must recognize and support these objectives. Agriculture is a major land use activity in the Missouri River basin. Farm Bureau policy encourages the U.S. Army Corps of Engineers (Corps) to protect agricultural land use by providing flood control for the 1.4 million acres of productive farmland at risk from Missouri River flooding. We are opposed to a spring rise on the Missouri River and believe that the Corps can achieve species protection without putting farmland and other property at risk. Flows must also be managed so that land drainage patterns are not disrupted in order for spring planting to occur on time while soil moisture and temperature can be managed for effective crop production. The Corps must also continue the hydropower generation necessary for rural towns and businesses and maintain navigation on the river for the commercial shipping of farm inputs and production outputs.

The contributions of the Missouri River to the Mississippi River are critical for maintaining the flows necessary for continuous navigation for commercial shipping. Over 60 percent of U.S. grain exports use the Mississippi River to efficiently reach foreign markets in a cost competitive manner. Flows must be maintained throughout the navigation season to ensure that barge traffic is not halted due to low water conditions.

We believe that the Corps should maintain the current Master Water Control Manual and not deviate from those standards and policies.

Western water issues are challenging and complex. However, they are also critical to farmers and ranchers and the rural economies that depend on their success. Solu-

tions to these issues are not easy. Any solutions must include and preserve a strong and vital agricultural base.

We appreciate the Committee's concerns and interest in these issues, and we look forward to working with the Committee on solutions that will benefit everyone.

APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

UNITED STATES DEPARTMENT OF COMMERCE,
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION,
Washington, DC, March 31, 2004.

Hon. PETE DOMENICI
Chairman, Committee on Energy and Natural Resources, U.S. Senate, Washington, DC.

DEAR MR. CHAIRMAN: Enclosed are the National Oceanic and Atmospheric Administration's (NOAA) responses to questions for the record relating to the Committee's March 9, 2004 hearing regarding water issues in the arid West.

Please feel free to contact me should you require additional information.

Sincerely,

DEBBIE LARSON,
Director.

[Enclosure.]

QUESTIONS FROM SENATOR DOMENICI

Question 1. Does NOAA engage in longer-term climatic predictions for periods of years or decades?

Answer. Currently, NOAA does not issue operational seasonal climate forecasts beyond 13 months, nor drought outlooks beyond a season. However, NOAA does have an active program in climate research and modeling at its Geophysical Fluid Dynamics Laboratory and its Climate Diagnostics Center that is directed at extending prediction capabilities decades in advance, as well as improving those capabilities. As scientific advances are confirmed, these improved capabilities in annual to decadal-forecasts will be transferred to the National Weather Service's National Centers for Environmental Prediction for improved operational forecasts of climate variability.

Question 2. What is NOAA's impression of the tree-ring and other long-term climatic record data in terms of helping us understand and predict long-term droughts?

Answer. Tree ring and other long-term climate records provide an understanding of climate fluctuations over the past several thousand years, including some insight into the magnitude, duration, and location of droughts. These records suggest that "mega" droughts are a natural fluctuation of climate. The challenge is to understand and be able to model the origins of these droughts in order to assess the likelihood of future occurrences.

Question 3. What do we need to do to expand the time horizon of our weather and climate prediction capability?

Answer. To expand the time horizon of weather and climate prediction requires: 1) a global observation network which includes observations for ocean, land, atmosphere, snow, and ice, 2) additional supercomputing capabilities which would allow the research and operational meteorological communities to assimilate the global data into numerical models and to simulate the interaction of ocean, atmosphere and land processes in order to predict climate variability, and 3) research that leads to a better understanding of climate variability—past, present, and future.

QUESTIONS FROM SENATOR BINGAMAN

Question 1. Climate Change—The GAO notes in a July 2003 report that the potential effects of climate change "create uncertainty about future water availability and use." Last month the Pacific Northwest National Laboratory issued a report based on a new climate change model that predicted a change in precipitation pat-

terns that would play havoc with the West's agriculture, fisheries and hydropower industry.

Answer. The report by the Pacific Northwest National Laboratory is consistent with previous research in indicating the strong likelihood of a warmer climate, which in turn will lead to more rain (instead of snow) in the west. The net result is less total snow pack and, consequently, earlier spring runoffs. However, caution should be used when interpreting these model results, given the uncertainty inherent within long-term model simulations, especially in the prediction of precipitation patterns.

Question 2. Has your organization done any in-depth modeling of the effects of climate change on precipitation patterns? If not, what has been the focus of your research related to climate prediction models?' Does the President's Climate Change Research Initiative provide for any in-depth research and modeling of the impacts of climate change on precipitation patterns in the United States? If not, why not?

Answer. Yes, NOAH continues to conduct in-depth research and related modeling of the effects of climate change on precipitation patterns. NOAA's Geophysical Fluid Dynamics Laboratory (GFDL) and Climate Diagnostic Center (CDC) have worked together and with other external researchers to assess the impacts of climate change on precipitation. NOAA also has pioneered seasonal climate forecasting and continues to be an international leader in this area with a strong focus on water cycle/drought monitoring and forecasting. The research results to date generally point to a greater uncertainty in the precipitation patterns related to climate change than we see in the temperature patterns. The Administration's Climate Change Research Initiative (CCRI) has a specific focus for reducing the uncertainty in projections of future climate and the relationship to precipitation patterns over the United States. The main modeling efforts in the United States that support the CCRI are at NOAA's GFDL and the National Center for Atmospheric Research (NCAR), whose primary sponsor is the National Science Foundation.

QUESTION FROM SENATOR DORGAN

Question 1. What do you see as the outlook for drought in the Upper Great Plains?

Answer. The seasonal outlook through June calls for improvement in the Upper Great Plains, including Minnesota, North Dakota, and eastern parts of South Dakota, Nebraska, and Montana. Some improvement (with drought ongoing) is called for in western portions of Nebraska and central and southwestern South Dakota. Because there are no strong forecast signals that point to either a wet or dry upcoming season, our predictions are largely based on average precipitation levels and average temperatures. Our prediction of limited improvement in these western areas is based on this area's experiencing greater precipitation deficits in the past than the eastern portions. These precipitation deficits in western areas will be hard to overcome as most of the precipitation that may fall will be absorbed by the parched soil. As examples of the magnitude of the precipitation deficits from past years, deficits since March 2001 exceed 12 inches in central South Dakota and parts of Nebraska.

DEPARTMENT OF THE ARMY,
U.S. ARMY CORPS OF ENGINEERS,
Washington, DC, April 6, 2004.

Hon. PETE V. DOMENICI,
Chairman, Energy and Natural Resources Committee, U.S. Senate, Washington, DC.

DEAR CHAIRMAN DOMENICI: Thank you for inviting the U.S. Army Corps of Engineers (Corps) to provide testimony on water issues in the arid West. In your letter of March 16, 2004, you asked that we respond to three questions submitted for the record. The questions address three issues: first, the Corps' capability and authority related to rural water supply; second, how the Corps is addressing specific community needs in the Missouri River Basin, and, finally, the Corps' authority to provide emergency response to drought. Our response to each question follows.

Question 1. Does the Army Corps feel that they have capability, competence, and/or authority to contribute to solving rural community water supply issues, in the west and if so how? Does the Corps role for rural communities change for eastern communities?

Answer. The Corps has the technical capability and competence to contribute to solving rural community water supply issues. However, this is not considered part of our core mission, and the degree of our participation is somewhat limited by current legislative policies and authorities. The legal authorities and programs through

which the Corps is able to help address water supply issues vary by location and all require that certain conditions of non-Federal participation are met. This limits the Corps' ability to respond in a consistent manner to regional or national water supply issues. Our ability to respond to a community's needs, to some extent, depends on the location of the community. In terms of large-scale programmatic efforts, the Corps does not have a current role.

We have worked with our many military customers to design and construct water supply, delivery, and sewerage facilities at military bases throughout the West. In the civil works arena, we have both planning and design capabilities at a number of our district offices, skills that can be leveraged to serve any location in the nation because of our regional business center concepts. In managing our reservoirs to supplement water supplies, we are in partnership with many agencies and non-governmental organizations, sharing technology advances in modeling and maximizing use of our scarce natural resources, including water supply and water quality, which go hand in hand.

There are several existing authorities and programs through which the Corps is able to help address water supply issues. Each has specific conditions, application, and limitations. They are: 1) Civil Works program (multi-purpose vs. single purpose projects); 2) Water-Related Environmental Infrastructure Authorities (site specific); 3) Reservoir reallocations (or deviations from water control plans); 4) Planning Assistance to the States; and 5) Emergencies. Items 1 through 4 are explained in the following paragraphs. The final item, Emergencies, is explained in response to Question 3.

Civil Works Program. Under current guidance, Section 301 of the Water Supply Act of 1958, 43 U.S.C. § 390b, the Corps may only include water storage for present or future municipal or industrial water supply as an added feature to a project that has other outputs, such as a flood control project. Water quality and water supply projects are not currently considered primary project outputs. When water supply outputs are included in projects, the additional water storage cost is borne by the beneficiary. The Corps currently does not have general authority to carry out a single-purpose water quality and water supply project; nor does the Corps currently have a general authority vested in the Secretary to carry out wastewater infrastructure projects, wastewater reclamation projects, or water supply infrastructure projects, even if the Secretary determines that such a project is in the public interest; produces general water quality, environmental, and public health and safety benefits; and is cost effective.

Water-Related Environmental Infrastructure Authorities. The Corps' standing authorities to contribute to solving water supply issues are limited to certain specified localities, States, or regions. For example, the Corps may provide design and construction assistance for environmental infrastructure including wastewater treatment facilities, and water supply, storage, treatment and distribution facilities, to designated localities with funds that are appropriated in accordance with Section 219 of the Water Resources Development Act (WRDA) of 1992, Public Law 102-580, as amended. The 1999 WRDA, Public Law 106-53, as amended, contains similar regional authorities such as Section 593, which is applicable to projects in central New Mexico and Section 595, which is applicable to projects in rural Nevada, Montana, Idaho, rural Utah, and New Mexico. Existing authorities vary from State to State, in their scope, and to some extent, in the credit granted. The existing authorities are being expanded by Congress to include new geographic areas, as evidenced by the recent expansion of Section 219 authority in Northern California and Section 595 authority to include rural Utah and New Mexico and proposed similar legislation for southern Colorado and west Texas. We are utilizing these authorities in the West to construct water related facilities as appropriated funds become available.

Reservoir reallocations. In the West, one common method to help regions deal with water shortages is to supplement the recharge of the groundwater basins through use of existing reservoir projects, either through the water control plan, through implementation of the drought contingency plan, or through temporary deviation from the approved water control plan on a short-term basis. Example benefits are reflected in annual recharge of over $15 million dollars worth of surface water to the aquifers of southern California. However, as such activities are only undertaken to the extent permitted by our current statutory authorities, the Corps' ability to fully implement this concept is limited;

Planning Assistance to the States. One of the Corps' programs that many smaller communities take advantage of to help solve water supply issues is the program known as Planning Assistance to the States. In this program, the Corps can study a wide range of water resource issues under the general recommendations of the State water resources department. These cost-shared studies constitute technical assistance and do not result in construction, but provide an excellent start to helping

local communities analyze their specific resource challenges, including that of water supply. Over the past few years, funding for this program has been exceeded by demand.

Question 2. I am extremely frustrated by the Federal Government's actions, or lack thereof, relating to the Missouri River. The people of the Missouri River Basin have been waiting since 1989 for a resolution regarding the Master Manual. But now the latest action from the Corps has yet to offer a permanent solution for communities facing water shortage. What are you going to do to address the needs of communities like Fort Yates and Parshall?

Answer. On March 19, 2004, the Corps of Engineers released its Record of Decision on the Final Environmental Impact Statement on the operation of the Missouri River dams and reservoirs, the new Master Water Control Manual and the final 2004 Annual Operating Plan. While these documents do not specifically address solutions for communities facing water shortages, we are continuing to closely monitor the Parshall, North Dakota situation and will help develop the necessary plans to deal with the temporary water intake based upon the projected lake levels. The Corps is working closely with the Bureau of Reclamation, which is the lead agency for resolution of the Fort Yates, North Dakota intake issue.

Question 3. Over the past few months, we have had in North Dakota what I will call a water supply crisis. The drought has been so devastating that water actually had to be cut off to one of our communities. Other communities have been threatened with the same outcome. What authorities does the Corps of Engineers have to provide emergency response to drought? Do these authorities need to be expanded?

Answer. The Corps may provide temporary emergency water assistance for human consumption or usage to a drought distressed area to meet minimum public health and welfare requirements under the authority of Public Law 84-99, as amended, 33 U.S.C. § 701 n. This authority is temporary in nature, and assistance is supplemental to State and local efforts. Currently, it does not appear necessary to expand this emergency authority.

In conclusion, the Corps knows that water is our most precious natural resource. We recognize the growing rural water supply challenges but have very limited authority to address these challenges. The Corps is available to contribute to solutions consistent with these authorities and administration policy.

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