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**Testimony Before the Select Committee
on Energy Independence and Global Warming
United States House of Representatives**

**Oversight Hearing
on
“Global Warming Effects on Extreme Weather”**

July 10, 2008

Chairman Markey, Ranking Member Sensenbrenner, and Members of the Select Committee:

Thank you for the opportunity to appear before you to discuss climate change and water supply impacts on Western irrigated agriculture. My name is Dan Keppen, and I serve as the executive director of the Family Farm Alliance (Alliance).

The Alliance is a grassroots organization of family farmers, ranchers, irrigation districts and allied industries in 16 Western states. The Alliance is focused on one mission: To ensure the availability of reliable, affordable irrigation water supplies to Western farmers and ranchers. We are also committed to the fundamental proposition that Western irrigated agriculture must be preserved and protected for a host of economic, sociological, environmental and national security reasons – many of which are often overlooked in the context of other policy decisions.

The topic of this oversight hearing is not only tremendously important to the Alliance, it also is immediately relevant water users, farmers, ranchers and small communities all over the West.

Alliance Involvement with Climate Change Issues

It is clear that climate change discussions will provide the forum for many other important policy issues to be addressed in the near future. The climate debate will be one where many interests will try to force their agendas. Those who have a balanced, practical and effective approach to dealing with climate change impacts will be viewed as reasonable parties. The Alliance board of directors in February 2007 made climate change a priority issue for the Alliance to engage in.

The Alliance in September 2007 released its climate change report, entitled “Water Supply in a Changing Climate: The Perspective of Family Farmers and Ranchers in the Irrigated West”. The report was prepared by a climate change subcommittee, Advisory Committee members, and water resources experts from around the West. Our report shows that climate change could further strain fresh water supplies in the American West. We must begin to plan for that now, and not wait until we are forced to make decisions during a crisis.

Alliance President Patrick O’Toole, a rancher from Wyoming, in June 2007 was invited to testify on this matter before the U.S. Senate Energy and Natural Resources. In the past year, our organization has been invited to speak on this topic at meetings sponsored by the California Agricultural Irrigation Association, Water Education Foundation, National Water Resources Association, Idaho Council on Industry and the Environment, Nevada Water Resources Association, and the Mid-Pacific Water Users.

President O'Toole, in December 2007, testified before the Senate Energy and Natural Resources Committee on S. 2156, the SECURE Water Act, sponsored by Senator Bingaman, Senator Domenici, and others. While there is not currently a companion bill introduced in the House, the bill includes water science initiatives; water efficiency programs; and an attempt to better understand and adapt to the water-related impacts of global climate change. S. 2156 contains some provisions that are very close to the recommendations provided by the Alliance in its white paper and testimony before Mr. Bingaman's committee in June 2007. The Alliance would encourage the House to take up a similar bill to help speed its enactment into law.

Current and Projected Impacts of Climate Change to Western Farmers and Ranchers

In the past two years, the public has been inundated with a flood of new studies that focus on projected climate change impacts to Western water resources. Predictions and conclusions reached about the impacts climate change will have on future water resources availability are as varied as the Western landscape. However, we are increasingly hearing reports that predict dire long-term hydrologic consequences for the West. Several studies further focus on specific regions or watersheds and are briefly discussed below.

Arizona

Experts in Arizona say that climate change is occurring and will likely have more impacts in the future to water resources. A climatic water budget runoff model has been developed for the Salt and Verde River basins of central Arizona¹, which used the outputs of six global climate models to estimate runoff in the future under assorted "scenarios" developed by the Intergovernmental Panel on Climate Change. Due to projected warmer temperatures by the year 2050, projected changes in runoff for the two basins suggest that the runoff from the Salt and Verde will have approximately an 85% chance of being less in the future due largely to warming in the study area. This could have significant impacts for these two basins, which have six dams, a variable hydrology, and a total storage capacity of 2.3 million acre-feet (as compared to the 27 million acre-feet capacity of Lakes Powell and Mead on the Colorado River).

¹ CLIMATE CHANGE 2050: IMPACTS ON RUNOFF FROM THE SALT AND VERDE RIVER SYSTEMS. PRESENTATION TO THE FAMILY FARM ALLIANCE ANNUAL CONFERENCE, February 22, 2007, Dr. Robert C. Balling, Jr., School of Geographical Sciences, Arizona State University

California

A report released in 2006 by the State of California² predicts that climate change will result in a drastic drop in the state's drinking and farm water supplies, as well as more frequent winter flooding. The report suggests that warmer temperatures will raise the snow level in California mountains, producing a smaller snowpack and more winter runoff. This means more floodwaters to manage in winter, followed by less snowmelt to store behind dams for cities, agriculture, and fish. By the year 2050, the statewide snowpack would shrink by 5 million acre-feet less water, more than the total capacity of Lake Shasta, the state's largest reservoir.

By 2050, the State study predicts that average snowpack in the Sierra Nevadas is likely to diminish by more than a third, and more precipitation will fall as rain rather than as snow, making it harder for reservoirs to capture for the long summer the same amount of water. The dwindling snowpack could reduce deliveries of Sierra supplies to Central Valley farmers by 10%.

According to another recent study developed by the University of California³, agricultural water users in the Central Valley are also the most vulnerable to climate warming. For the driest climate warming scenario assessed, the predicted hydrology would reduce agricultural water deliveries by about a third. For that dry scenario, the study speculates that, while financial losses to the agricultural community would be compensated by water sales to urban areas, much of this loss would likely result in an uncompensated structural change in the agricultural sector.

Colorado River Basin

A February 2007 report by a National Research Council (NRC) committee⁴ says agriculture is the likeliest target for shifting use to urban needs in the fast growing West. But it cautions that "the availability of agricultural water is finite." It adds that rising population and water demands "will inevitably result in increasingly costly, controversial and unavoidable trade-off choices" in managing a shrinking resource. Future droughts may be longer and more severe because of a regional warming trend that shows no signs

²OUR CHANGING CLIMATE – ASSESSING THE RISKS TO CALIFORNIA, A summary biennial report from the California Climate Change Center, 2006.

³CLIMATE WARMING AND WATER MANAGEMENT ADAPTATION FOR CALIFORNIA, Stacy K. Tanaka et al, Department of Civil and Environmental Engineering, Department of Agricultural and Resource Economics, University of California, Davis 95616

⁴ COLORADO RIVER BASIN WATER MANAGEMENT: EVALUATING AND ADJUSTING TO HYDROCLIMATIC VARIABILITY, National Research Council, Division on Earth and Life Studies, Water Science and Technology Board, 2007.

of dissipating, the NRC report notes. It also states that a preponderance of evidence suggests that rising temperatures will reduce the river's flow and water supplies.

The committee also looked at how a steadily rising population and related increases in water demand will affect Colorado River water management. The population across the western United States has grown rapidly. Despite some successful water conservation efforts, urban water use in the region has increased significantly along with the expanding population. Increasing urban water demands are often met through sales, leases, or transfers of water rights from farm users. Water transfer agreements will be limited in their ability to satisfy growing, long-term demand, according to the NRC committee, and such agreements may also cause problems for third parties, such as downstream farmers or ecosystems. Technology and conservation measures are useful and necessary for stretching existing water supplies, the committee acknowledged, but any gains in water supply will be eventually absorbed by the growing population.

Pacific Northwest

Last April, the Intergovernmental Panel on Climate Change released a report⁵ that predicts climate-change related impacts to water resources in the Pacific Northwest. Similar to predictions made in other parts of the West, dwindling mountain snowpack is expected to make summer water scarce especially east of the Cascades, where agriculture is a strong component of rural communities.

Snowpack in the Cascade Range holds two-thirds of the region's stored water. As it melts during the dry summer months, it fills rivers, generates hydropower, and helps meet the water needs of irrigation, fish, recreation and growing urban areas. However, Cascade snowpack has diminished in the past 50 years and is expected to further shrink. Projected warmer winter temperatures will cause snowpack to melt earlier in the spring, which could exacerbate both spring-time flooding and late-summer drought conditions. This prediction does not bode well for irrigation-dependent eastern portions of Oregon and Washington.

Utah

A 2003 study directed by Congress and led by Utah State University professor Frederick Wagner⁶ lays out a variety of possibilities if temperatures increase from nearly 4 to 6 degrees Fahrenheit by 2100. The potential scenarios range from increased precipitation

⁵ CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, World Meteorological Organization and the United Nations Environment Program.

⁶ Professor emeritus of the Department of Forest, Range and Wildlife Science at Utah State University.

(with decreased snowpack and greater downstream flood risks) to decreased precipitation (desertification and a decline in water resources). In all scenarios, water management changes would be required, and the worst-case scenario would likely trigger water transfers from agriculture to urban areas, which would contribute to a sharp decline of farming and ranching. Water resources experts in Utah also realize that new surface water storage projects may be necessary to capture more snowmelt or more water from other sources⁷. The Southern Nevada Water Authority – which has essentially used up its share of Colorado River water - is already planning to take groundwater out of aquifers under the Utah-Nevada state line and pipe it to Las Vegas. Ranchers in this area are fighting this proposal.

Summary of Anticipated Impacts to Agricultural Water Users

The Western Governors' Association (WGA) last year testified in support of a bill that would reorient and fully fund the U.S. Global Change Research Program to make it more user-driven. The WGA testimony mirrors many of the common themes and findings developed in the reports identified above. WGA found that we can expect to see the following general effects and impacts caused by warming future temperatures in the Western U.S.:

- Smaller snow packs and earlier snowmelt will affect reservoir storage and demand for water and impact productivity and value of hydroelectric generation;
- More rain than snow is likely, with uncertain projected impacts to overall precipitation amounts in specific areas;
- Extreme flood events could be more common and larger.
- Droughts and higher temperatures would be more intense, frequent and last longer, which would increase stream and reservoir evaporation, diminish surface water supplies, and stress groundwater supplies and water quality.

Despite the highly variable and uncertain nature inherent with climate change predictions, it can safely be concluded that, in the West, with a warming climate, there will be less water stored in our biggest reservoir...the snow pack. More water in the form of rainfall and runoff will come at farmers and ranchers sooner in the season, when it may not be useful and may even present a threat.

⁷ Professor Jack Schmidt, Utah State University, Dept. of Aquatic, Watershed, and Earth Resources, quoted in "Global Warming: What about water?", *Salt Lake City Tribune*, October 30, 2006.

What are Irrigators, Water Agencies and Businesses Doing to Address Climate Impacts?

While a great deal of scientific inquiry and public discourse has been focused on climate change and its possible consequences for the planet's future, Western irrigators and irrigation districts are concerned about the problems threatening their water supplies today – drought and urban population growth. Even without climate change, these factors present an immediate crisis for agricultural water users in the West. If the effects of climate change are anything like those outlined in the research discussed here today, Western irrigated agriculture could be greatly impacted, and possibly eliminated. This is, of course, worrisome to farmers and ranchers and their communities. It ought to be of great concern to the nation as a whole because climate change may result in a disruption of food production worldwide. If that is what is in store for us, then this country cannot afford to lose the food production capacity of Western irrigated agriculture.

The response of irrigators and water agencies to current water supply challenges can provide some insight into the possible measures that might be taken to cope with long-term water supply reductions resulting from climate change.

Drought Response

Much of the West is currently in drought or facing reduced water supplies as a result of environmental regulation. In response, farmers and water agencies are taking creative measures to conserve water and increase the efficiency of irrigation. Here are a few examples.

- In the San Joaquin Valley of California, state-of-the-art drip irrigation systems water some of the most productive farmland in the world.
- Further north, in the Sacramento Valley, producers and local governments are working to develop a regional water management program that will help address not only water quantity challenges, but also water quality and environmental issues. Those same growers 15 years ago were key players in a state-managed drought water bank that temporarily transferred local water to southern California to meet other statewide needs.
- In Idaho, water users are working with state and federal agencies and the Nez Perce Tribe to settle longstanding disputes and create more certain water supplies.
- Along the Columbia River, irrigators are developing water exchange programs to increase supply reliability while improving salmon habitat.

Pressures of Urban Population Growth

The West is the most rapidly growing part of the United States. Yet, water supplies there are essentially static. In some areas, urban demand for water -- and land -- is straining agriculture and rural communities to the breaking point. New environmental water demands imposed by regulatory agencies or courts also first look to agriculture. This is happening in every state, but farmers and ranchers point to some striking examples:

- A report released in 2006 by Environment Colorado found that, from 1987-2002, Colorado lost an average of 460 acres per day of ag land. The report predicts 3.1 million more acres will be lost to development by 2022.
- Arizona's massive Salt River Project (SRP) in a few years will cease to provide water to agriculture in order to meet new demands exerted by development.
- In Las Vegas, Nevada, over 70,000 new residents are moving in every year, and urban water officials are looking to rural areas to satisfy its growing thirst.
- A restoration agreement developed for the Platte River could potentially dry up hundreds of thousands of acres of farmland in Nebraska and Wyoming, in order to reallocate water to meet the perceived needs of imperiled fish and wildlife.
- The California Department of Conservation indicates that more than 1 million acres of farmland in the state was converted between 1988 and 1998. Last year, California's population officially topped 37 million, a growth rate of 1.4 percent, representing 500,000 new residents in the last fiscal year.

Farmers, ranchers and rural communities cannot solve the water supply problem created by the Western population boom. Nor can they be expected to sacrifice their livelihoods for the "greater good" of golf courses, strip malls and housing developments.

Farmland is disappearing at a time when the U.S. needs a more stable domestic food supply (just as it needs a stable energy supply). We are concerned that this critical issue -- which becomes even more serious when viewed in the context of projected climate-change impacts to water supplies - is being overlooked by our national leaders.

A reliable, safe and sustainable domestic food supply is just as important as a strong military to the protection of our national interests. The post 9/11 world of terrorist threats makes the stability of domestic food supply even more pressing.

What are Western Irrigators Doing to Reduce Greenhouse Gases?

Western farmers and ranchers are already taking actions to reduce greenhouse gases and other possible contributors to climate change. Some of these actions are undertaken consciously with this objective in mind; others have been implemented as part of the broad portfolio of actions that successful farmers have to take to stay profitable in today's economic and regulatory climate. In virtually every Western state, there are examples of activities that agricultural producers are taking that have an overall effect of reducing carbon dioxide emissions, which many policy makers believe are a primary contributor to global warming. These actions include:

- Use of cleaner and more efficient diesel engines;
- Reduction of energy needs on farms;
- Use of biodiesel;
- Low-till practices;
- Involvement in conservation programs, which provide incentives to set aside thousands of acres of farmland for wildlife habitat;
- Selling carbon credits to industries for approved management actions.

Probably most obviously, and most importantly, crops turn carbon dioxide into oxygen. Further, new research suggests that irrigation has kept croplands cool, countering to some extent the rising temperatures caused by greenhouse gas emissions over the last half century.⁸

Recommended Strategies to Address Potential Impacts

Western water supplies are already inadequate to the demands of agriculture, urban growth and environmental enhancement. Global climate change, we're told, will further reduce those supplies. We recommend an adaptive approach to dealing with the uncertainties of climate change. Even if current efforts to mitigate for greenhouse gas emissions are successful, it is our understanding that the climate is still predicted to warm considerably over the next several decades. This tells the irrigation community in the West that we must begin to prepare for a warmer climate and be able to adapt in order to survive its projected impacts.

So how will we meet the ever-increasing demand for water in the West in an era when

⁸ Kueppers, L. M., M. A. Snyder, and L. C. Sloan (2007), IRRIGATION COOLING EFFECT: REGIONAL CLIMATE FORCING BY LAND-USE CHANGE, *Geophys. Res. Lett.*, 34, L03703, doi:10.1029/2006GL028679.

⁸ WESTERN WATER SUPPLY ENHANCEMENT DATABASE, Family Farm Alliance, 2005.

there will be an ever-decreasing supply? Improved conservation and efficiency by urban and agricultural water users is certainly part of the solution, but only part,

1. Implement a Balanced Suite of Conservation and Supply Enhancement Actions

We believe that it is possible to meet the needs of cities and the environment in a changing climate without sacrificing Western irrigated agriculture. To achieve that goal, we must expand the water supply in the West. There must be more water stored and available to farms and cities. Maintaining the status quo simply isn't sustainable in the face of unstoppable population growth, diminishing snow pack, increased water consumption to support domestic energy, and increased environmental demands.

It is simply ludicrous to believe that conservation alone will supply enough water for the tens of millions of new residents expected to arrive in Western cities during the coming decades. Farmers and ranchers understand that conserved water cannot realistically be applied to instream uses, as it will more likely be put to beneficial use by the next downstream appropriator or held in carryover storage for the following irrigation season.

Many water projects are ready and waiting to be developed in the West⁹. While conservation and recycling programs have done a tremendous job of meeting new growth, still, only a small amount of new water has been developed in the past 30 years. We cannot continue to “conserve just a little more” forever. It's time to start developing and implementing the water infrastructure needed to cope with a changing climate, meet the needs of a burgeoning population, and support a healthy agricultural base in the West.

2. Streamline the Regulatory Process to Facilitate Development of New Infrastructure

Modern, integrated water storage and distribution systems can provide tremendous physical and economic flexibility to address climate transformation and population growth. However, this flexibility is limited by legal, regulatory, or other institutional constraints, which can take longer to address than actually constructing the physical infrastructure¹⁰.

The often slow and cumbersome federal regulatory process is a major obstacle to realization of projects and actions that could enhance Western water supplies. In addition, there exists with agencies a defeatist attitude that no dams or water supply projects will be built. So, there is no commitment to earnestly begin and engage the

¹⁰ CLIMATE WARMING AND WATER MANAGEMENT ADAPTATION FOR CALIFORNIA, Stacy K. Tanaka et al, Department of Civil and Environmental Engineering, Department of Agricultural and Resource Economics, University of California, Davis 95616

difficult problems described above. The Family Farm Alliance wants to work with Congress, federal agencies and other interested parties to build a consensus for improving the regulatory process.

3. Prioritize Research Needs

Our country has tremendous, but limited, resources available to fix our problems, so we must prioritize. One priority research item should be a comprehensive validation of West-wide changes in climate change-driven streamflow. This should be followed by quantification of the amount of additional reservoir storage, conservation targets, etc required to re-regulate this change in hydrology. This would quickly illustrate to policy makers the need to start modernizing our water infrastructure. This assessment should be accompanied by a comprehensive study of the collective impacts of agricultural land and water changes in western states over the last 10 years, as well as predicted trends. A study of this sort may provide the type of hard findings that may help wake up policy makers on the “big picture” ramifications of this issue.

The potential water impacts associated with use of alternative fuels must also be studied. Throughout the West, we are seeing proposals to build plants to make ethanol, another “answer” that may (or may not) lower greenhouse gas emissions. An April 2007 *Sacramento Bee* editorial provides a reality check on how much water it would take to grow all the corn required to meet California’s goal of producing a billion gallons of ethanol a year. According to the *Bee*’s calculations, that’s about 2.5 trillion gallons of water for 1 billion gallons of ethanol, which is more than all the water from the Sacramento-San Joaquin Delta that now goes to Southern California and valley farms. Because there is only so much water for agriculture in California and other Western states, this means that some other existing crops will not be grown, thus furthering our dependence on imported food sources.

Another growing demand that will be placed on Western water resources is driven by power requirements. The total water consumed by electric utilities accounts for 20 percent of all the non-farm water consumed in the United States. By 2030, utilities could account for up to 60 percent of the non-farm water, to meet the water needs required for cooling and pollutant scrubbing. This new demand will likely have the most serious impacts in fast-growing regions of the U.S., such as the Southwest. Even without warming climate conditions, continued growth in these regions will put the squeeze on both water and power use. When you throw in climate change considerations, the projections look worse.

Conclusion

Climate change could further strain fresh water supplies in the American West. We must begin to plan for that now, and not wait until we are forced to make decisions during a

crisis. Relying on agriculture to be a “shock absorber” to soften or eliminate the impending water shortage is not planning. It is a choice to put our heads in the sand and hope for the best. It is a decision that could worsen the overall impact of climate change on our nation’s economy and security.

Millions of acres of barren land have been transformed into the most efficient and productive agricultural system in the world. About 5 percent of the land area of the West is irrigated, and the Bureau of Reclamation provides water to about one-fifth of that acreage. All of this has been done for a total federal investment of \$11 billion. A 1998 study found that the economy of the United States receives a greater than 100% return each year on this investment¹¹.

Now is not the time to retreat from our investment. Now is the time to enact sound policies that encourage continued investment in irrigated agriculture. Allowing water-short cities to absorb farmers’ water supplies will significantly diminish domestic food production at exactly the same time global warming is predicted to severely adverse impact food production worldwide.

The U.S. recently became a net importer of food. The U.S., which once fed much of the world, now imports more food than it exports. Food production, like so many of our industries and services, is moving off shore, and a large part of our security is moving with it.

Europeans aggressively protect their farms and food production capability because they still remember the hungry years during and after World War II when they relied on other nations, America in particular, to feed them. The time has come – indeed, it’s long overdue – for the United States to similarly adopt an overriding national goal of remaining self-sufficient in food production. Policy decisions on a wide range of issues ranging from taxation to the management of natural resources should then be evaluated to be sure they are consistent with that goal. It’s hard to imagine a simpler or more important step to safeguard the American public.

While much of the debate surrounding what to do about climate change has centered on mitigation for greenhouse gas emissions, we believe that climate change policies for irrigated agriculture in the future need to address adaptive approaches that prepare for the worst case scenarios predicted for Western watersheds. We must look to increasing available fresh water supplies through a balanced approach of improved watershed management, water conservation techniques, and increased water storage facilities – both on the surface and in our aquifers. Our infrastructure is aging and we must continue to

¹¹ That report and associated data was produced by Darryll Olsen, Ph.D. of the Pacific Northwest Project in Kennewick, Washington and Houshmand Ziari, Ph.D. of IRZ Consulting in Hermiston Oregon. The report was prepared for the Family Farm Alliance.

invest in rehabilitation and improvement of our existing facilities. We must look to new technologies, better research and studies, and improved management tools to be prepared for such dire climatic predictions. And, we must work toward more collaborative approaches that protect our irrigated agriculture, our cities and towns, and our environment for future generations to enjoy.

Thank you for the opportunity to testify on this important subject, and I would answer any questions you might have.