

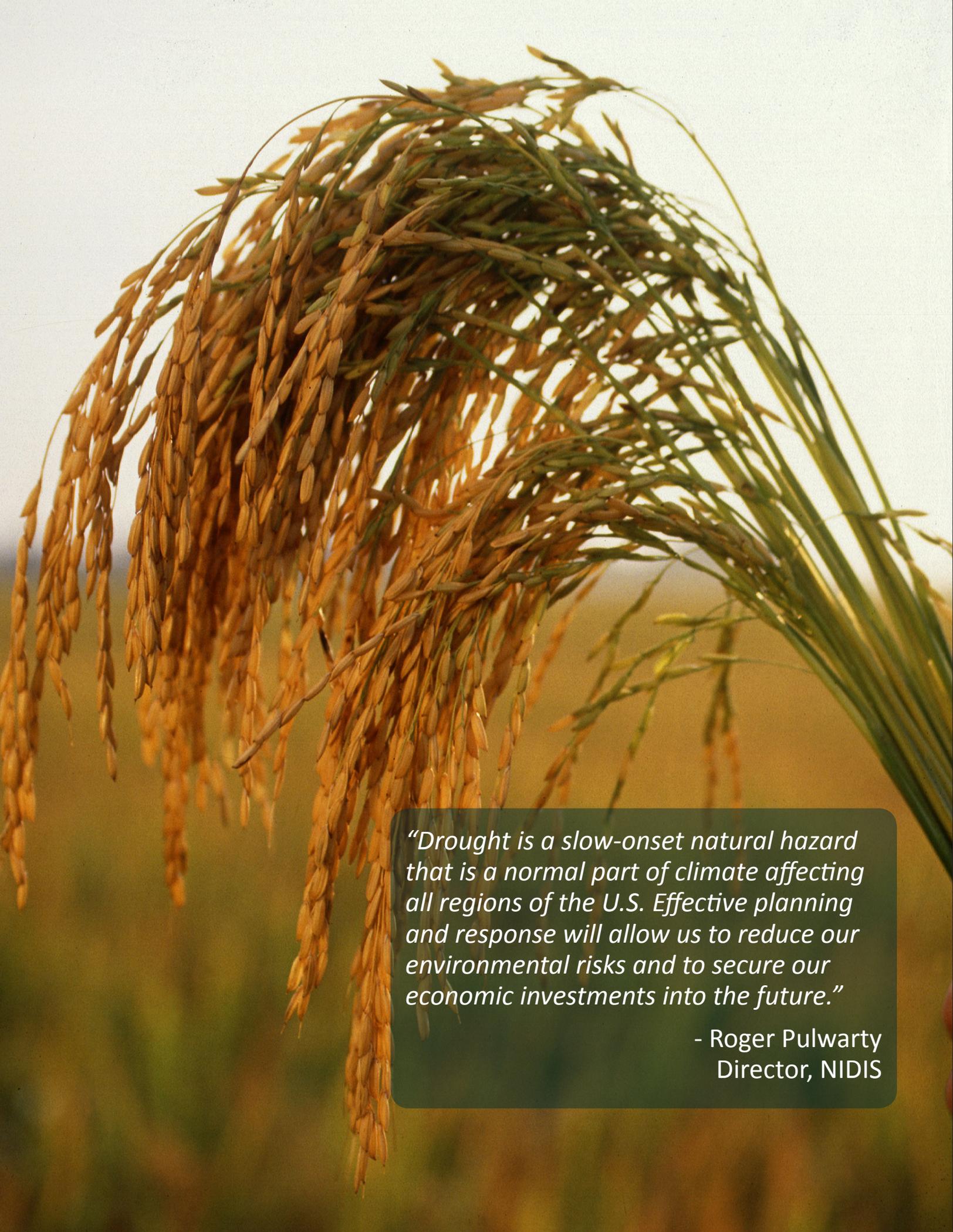
National Drought Forum

Summary Report and Priority Actions



2012

Drought and U.S. Preparedness
in 2013 and Beyond



“Drought is a slow-onset natural hazard that is a normal part of climate affecting all regions of the U.S. Effective planning and response will allow us to reduce our environmental risks and to secure our economic investments into the future.”

- Roger Pulwarty
Director, NIDIS

National Drought Forum 2012

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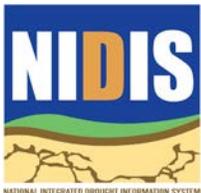
Summary Report and Priority Actions

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Document prepared by the National Integrated Drought Information System. For more information about NIDIS, visit: www.drought.gov.

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Planning for the National Drought Forum was coordinated with the National Disaster Recovery Framework (NDRF). For more information, visit: www.fema.gov/national-disaster-recovery-framework

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Introduction

On December 12-13, 2012, the National Drought Forum was held at the Hall of States in Washington, D.C. The Forum was planned and coordinated by the National Integrated Drought Information System (NIDIS) Program Office, a part of the National Oceanic and Atmospheric Administration.

The Forum was co-sponsored by the following agencies and organizations:

- Federal Emergency Management Agency (FEMA)
- Midwestern Governors Association (MGA)
- National Drought Mitigation Center (NDMC), University of Nebraska-Lincoln
- National Oceanic and Atmospheric Administration (NOAA)
- Southern Governors' Association (SGA)
- U.S. Department of Agriculture (USDA)
- U.S. Department of the Interior (DOI)
- U.S. Environmental Protection Agency (EPA)
- University Corporation for Atmospheric Research (UCAR)
- Western Governors' Association (WGA)

The National Drought Forum Steering Committee (Committee) was established to assist in the Forum's planning. The Committee developed the Forum's goals & objectives, agenda, identified speakers and participants, and helped prepare them for the event.

The primary goals for the National Drought Forum were to understand the extent of 2012 drought impacts and response, and help provide new information and guidance for coordination to improve the nation's preparedness for drought and more specifically, enhance drought readiness for 2013 and beyond.

The Forum convened high-level drought experts and stakeholder from impacted regions from all levels of government and the private sector, including federal, state, tribal, and local governments, and research institutions. The result was a candid and enlightening conversation that produced a list of 'action items' that could improve U.S. drought readiness and resilience.

Action Items were subsequently organized under five key themes:

- I. Drought and Water Supply Monitoring and Prediction
- II. Communications
- III. Preparedness Planning
- IV. Reducing the Risk, Mitigating the Impacts and Adapting to the Future
- V. National Investments and Opportunities



Forum Goals and Context

65.45%

"The continental U.S. drought coverage reached a peak of 65.45% in 2012. The costs associated with the 2012 drought could surpass Superstorm Sandy, and make it one of the top three costliest disasters since 1980."

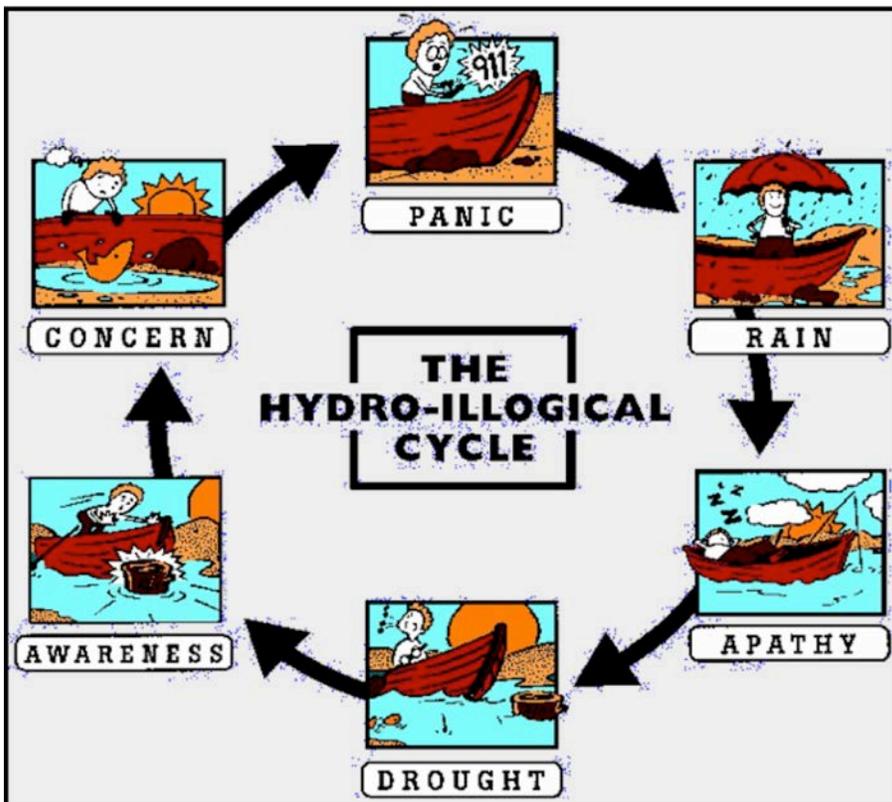
– Brad Rippey, USDA Meteorologist

Forum Co-Chair Robert Detrick, Ph.D., Assistant Administrator, Office of Oceanic and Atmospheric Research, NOAA, convened the National Drought Forum and described its goals and desired outcomes. Given the geographic extent of the 2012 drought and its wide-spread impacts, Dr. Detrick laid out a plan for the Forum to explore both the drought’s impacts, and responses that were mounted across key economic sectors, regions, and programs. Additionally, given that droughts are a natural component of climate, Forum participants considered the nation’s overall drought readiness, particularly as 2012 drought impacts continue into 2013. Based on the panel discussions, keynote presentations, and break-out sessions during the Forum, Dr. Detrick charged the Forum participants to develop a list of action items for improving the nation’s level of preparedness for future droughts, and for guiding and informing a collaborative effort to improve drought preparedness in the coming months and years.

Forum Co-Chair Don Wilhite, Ph.D., Professor of Applied Climate Science in the University of Nebraska’s School of Natural Resources, and founding Director of the National Drought Mitigation Center, provided useful context for the Forum, discussing the institutional challenges for improving drought management and laying out important goals for national drought policy. Dr. Wilhite characterized the challenges of moving toward a more proactive approach to drought management by presenting a graphic of the “hydro-illogical cycle.” He concluded that we have responded historically to drought through crisis management, with this admonishment: “If you do what you’ve always done, you’ll get what you’ve always got.” The outcomes of the crisis management approach have typically been a response that is untimely and poorly coordinated. Crisis management treats the symptoms of drought (impacts) rather than the causes for the impacts (vulnerabilities and poor management).

Dr. Wilhite offered the following goals for a national drought policy:

- Proactive mitigation and planning measures, risk management, public outreach and resource stewardship.
- Greater collaboration to enhance the national, regional, and global observation networks and information delivery systems to improve public understanding of, and preparedness for, drought.
- Incorporation of comprehensive governmental and private insurance and financial strategies into drought preparedness plans.
- Recognition of a safety net of emergency relief based on sound stewardship of natural resources and self-help at diverse governance levels.
- Coordination of drought programs and response in a more effective, efficient, and customer-oriented manner.



The hydro-illogical cycle characterizes the typical reactive approach to drought management, commonly referred to as crisis management. (Source: National Drought Mitigation Center, University of Nebraska)



While the December 2012 National Drought Forum (NDF) focused on improving government coordination to support the planning and preparedness needed for enhancing resilience to ongoing or reoccurring drought, the federal government is also engaged, at the highest levels, on addressing immediate needs for response and recovery.

In August 2012, President Obama called for an “all hands on deck” approach to the Nation’s ongoing drought, and asked Secretary of Agriculture Tom Vilsack to lead the Federal government’s drought recovery efforts. As part of the President’s charge, in Fall 2012, USDA partnered with tribes, local, state and federal partners to hold four regional public recovery meetings in drought-stricken areas around the country. At these meetings, stakeholders presented their experiences, identified issues, and explored what tools may be available to help with disaster response to and recovery from the current drought.

The NDF effort complemented the USDA-led recovery efforts for the 2012 drought disaster by beginning to frame the needs and priorities for improving the nation’s preparedness for drought and enhancing its readiness for 2013 and beyond.



Forum Summary

"In Kansas, streams experienced historic low flows during 2012. Many aquifers received very little recharge if any, and some wells were unable to produce water...All 105 counties in Kansas are in emergency drought status and at least 197 communities have initiated drought response measures."

– Sam Brownback
Governor, Kansas

On the opening day, six panels of experts covered a range of issues, including drought forecasting and monitoring and an integrated drought early warning system; the impacts and response to this year's drought; preparation plans for the continuation of drought into 2013; and the importance of in-tergovernmental coordination.

Among the key themes at the Forum and messages that came out of the panel discussions were:

- Drought is a creeping threat that spreads across much of the nation.
- Drought information made available in 2012 was much improved relative to information available during previous droughts.
- Communication of drought information has also improved.
- Collaboration and partnerships within and between all levels of government and the private sector are essential to address drought.
- NIDIS has provided excellent drought early warning guidance and has improved information flow, communication, and early warning pilots to assist the public.
- The USDA-led National Disaster Recovery Framework (NDRF) can provide a process through which to coordinate federal actions and leverage resources for drought recovery.
- USDA was responsive and utilized its disaster declaration process in a timely fashion.
- The lack of a Farm Bill has handicapped drought response efforts.
- The U.S. Drought Monitor is a key tool being used by decision makers and the public, to obtain drought forecast information and projections.

- Funding reductions for the snow survey conducted by USDA's Natural Resources Conservation Service (NRCS) (i.e., SNOTEL network) has hindered drought management and planning in the West.

Bob Perciasepe, EPA Deputy Administrator, was the keynote speaker on the opening day. He discussed EPA's role in drought preparedness and response, and the opportunities for improved collaboration.

On the Forum's second day, Co-Chair Don Wilhite covered key themes and issues that emerged from the first day's discussion.

In his keynote address, Kansas Governor Sam Brownback highlighted the extent of the current drought and described its impacts in the state of Kansas, as well as the state's efforts to respond to the drought. The Governor described the stresses placed by drought on groundwater resources and the actions being fostered by state government and local users to restore important groundwater aquifers. Governor Brownback also stressed the importance of reservoirs in Kansas for water storage and the challenges posed by siltation. He urged the states to work in partnership with the U.S. Army Corps of Engineers (USACE) to dredge reservoirs to regain needed water storage capacity. The Governor also highlighted the shortcomings of current crop insurance programs whereby producers continue to water their crops, even when the crops have already died due to drought.

Governor Brownback's recommendations included:

1. Create incentives for producers to move to low-water crops, e.g. sorghum, that could be used for renewable biofuels production (instead of corn);



2. Call for Congressional reauthorization of the Water Resources Development Act (WRDA), and consideration of a joint proposal from Kansas, Texas and Oklahoma that seeks to improve storage pricing and add flexibility to non-federal in-kind contributions; and
3. Urge Congress to pass a well-crafted Farm Bill that includes:
 - Limited Irrigation Crop Insurance
 - Water conservation provisions in a new Regional Program
 - Adding grassland to the Conservation Reserve Program (CRP), with special enrollments that carry a lower payment rate
 - Maintenance of the CRP, Environmental Quality Incentives Program (EQIP), and Conservation Stewardship Program (CSP).

Finally, the Governor called for additional technical assistance to build drought resilience; sustainable funding for stream gages and production of drought-related data; providing more outreach to impacted communities; and to formulate conservation plans.

Following Governor Brownback, a panel of high-ranking federal agency officials discussed current federal authorities and programs relevant to drought and considered opportunities and options for better coordinating and integrating federal programs to improve U.S. drought readiness. The following speakers participated on the panel:

- John Tubbs, DOI Deputy Assistant Secretary for Water and Science

- Michael Scuse, USDA Under Secretary for Farm and Foreign Agriculture Services
- Ann Mills, USDA Deputy Under Secretary for Natural Resources and the Environment
- James Dalton, Chief of Engineering and Construction, USACE
- Jay Jensen, Associate Director for Land and Water Ecosystems, White House Council on Environmental Quality (CEQ)

Some themes/messages that came out of the federal panel included:

- The Administration is using the National Disaster Recovery Framework (NDRF) to organize and coordinate on drought preparedness, response, and recovery.
- The Administration is considering the relevance of climate change as it relates to drought, and the corresponding need for adaptation strategies and strategies for protecting fresh water resources.
- The National Ocean Policy is an important focus for water resources management and climate adaptation.
- We need to consider the environmental impacts of drought on fish, wildlife and plants.
- The Administration is looking across landscapes (e.g. the San Francisco Bay Delta), and trying to get ahead of water conflicts between threatened and endangered species and water supply for cities and agriculture that arise during shortages.

- Addressing the impacts of droughts on commercial navigation, and specifically how to balance water demands in order to facilitate barge traffic on major waterways.
- The energy-water nexus, and the specific challenges that water shortages create for energy development and use.
- The impacts of drought on water quality and water supply.

Following the federal panel, Secretary of Agriculture Tom Vilsack delivered a keynote speech. Secretary Vilsack outlined a number of actions USDA has taken in response to the current drought. These include establishing a crop insurance grace period, providing loans to stabilize markets, haying and grazing assistance, \$5 million for the Conservation Innovation Grant Program, and \$30 million for agricultural conservation programs. The Secretary also described feedback obtained through the National Disaster Recovery Framework listening sessions, and urged more focus on water infrastructure improvements. To that end, he exclaimed that “the time to plan for drought is during a flood.” The Secretary called for additional research to better understand the interrelationship between drought and climate change, in order to develop better forecasting capabilities. He also called for timely drought disaster assistance.

The Secretary made the following announcements during his remarks:

1. USDA and the DOC finalized a Memorandum of Understanding (MOU) to

“Better partnerships within the Federal family are, as we scientists say, ‘necessary but not sufficient’. It is even more essential that the Federal family partners more effectively with all of you and the organizations you represent, if we are to achieve the more ambitious aims of drought readiness and resilience that are laid out in the new Memorandum [between USDA and NOAA].”

– Kathryn Sullivan
Acting NOAA Administrator

better facilitate the sharing and evaluating of data (described more fully below).

2. USDA made \$16 million available through the Environmental Quality Incentives Program (EQIP) to spur conservation in drought-stricken areas.
3. USDA established a pilot program to accept applications to use EQIP resources to allow producers to dredge farm ponds (taking advantage of the low water levels during the current drought).
4. The US Army Corps of Engineers is removing impediments (e.g. rock pinnacles) to facilitate better navigation in the Mississippi River.

Dr. Kathryn Sullivan, NOAA’s Deputy Administrator, now Acting Administrator, followed Secretary Vilsack and reiterated the NOAA-USDA MOU signing that provides a framework for cooperative efforts to meet weather and climate information needs. Specific collaborative activities described in the MOU¹ include:

1. Improving forecast reliability and projection of weather and climate extremes.
2. Improving accessibility, compatibility, and sharing of data, analysis, and expertise through development of regional and international drought and disaster early warning information systems, and through the development of communications tools and processes to inform preparedness, response, and adaptation.
3. Improving drought and water resources data acquisition, monitoring networks, and databases.
4. Enhancing adaptation strategies for at-risk regions in the U.S. and for other areas that affect U.S. commodities and markets and natural resource management; and
5. Improving integrated weather, climate, and economic research, tools, and models to enhance decisionmaking, risk management and long-term planning.

The Forum’s final panel consisted of Congressional staff from the key Committees with jurisdiction over drought-related programs. Betsy Cody from Congressional Research Service moderated the panel and laid out how Congress is structured relevant to drought policy and described the various committees’ authorities and jurisdictions. The following panelists then described legislative proposals related to drought issues that their respective committees would consider in the coming months:

- Sara Tucker, Senate Committee on Energy and Natural Resources
- Tina May, Senate Committee on Agriculture
- Tara Rothschild, House Committee on Science, Space and Technology
- Jon Pawlow, House Committee on Transportation and Infrastructure
- Kelvin Stroud, Staff to Senator Mark Pryor and the Senate Water Caucus



¹ The MOU was signed on December 21, 2012, and can be found at: www.esrl.noaa.gov/news/USDA_DOC_Drought_MOU.pdf



Priority Actions

NOTE: Priority Actions resulting from the National Drought Forum do not necessarily represent official Administration policy or position, or an official policy or position of the individual organizations represented at the Forum.

During the National Drought Forum, significant focus was given to considering how to improve the nation's resilience to, and preparedness for, future droughts. Just as the impacts from droughts stretch across all regions of the country and all sectors of the economy, actions taken to protect against, mitigate impacts from, respond to, and recover from droughts require cooperation and coordination across all levels of government—federal, tribal, state and local—and the private sector.

Given current and evolving drought conditions, Forum participants discussed ways to leverage and build on existing efforts to improve drought preparedness. The following priority actions were identified by participating federal, state, local, tribal governments and agencies, and organizations at the Forum. Implementation of these actions will be considered in coordination with the USDA-led National Disaster Recovery Framework process that is currently underway, and in collaboration with relevant federal, regional, state, tribal and local government agencies, research institutions, and the private sector.

The following six (6) priority actions were identified by the Steering Com-

mittee as needing immediate attention. They were synthesized from a more comprehensive list of short- and long-term actions (see 'All Opportunities' on page 10). Activities are already underway for many of these six priority actions.

Plans and timelines to implement these actions, in full or in part, will require and engage a coordinated approach involving federal, state, local, and tribal governments and agencies, organizations and the private sector; leveraging as many existing resources and assets. Any lead roles and responsibilities that might need to be designated, in order to implement actions, will be done through a coordinated effort, and will require, where appropriate, future interagency agreements.

Immediate Opportunities

I. Drought Preparedness Planning & Plan Implementation – Existing drought plans (and related resource management plans) should be reviewed and revised as appropriate, and implemented in order to proactively reduce and mitigate the impacts from drought. Where drought preparedness plans do not

yet exist, federal agencies, states, tribes, communities, utilities, and others should develop and implement planning processes utilizing incentives, model drought plans and technical guidance.

II. National Drought Early Warning Outlooks & Communications

– Hold a series of National Drought Early Warning Outlooks, beginning in early 2013, to review ongoing forecasts for drought evolution and options for improving preparedness. In addition, provide regular, real-time coordination and information sharing with the public and among all stakeholders on the status, impacts, and prospects for drought throughout 2013 and beyond.

[NOTE: The first of these was held in Washington, DC on February 21, 2013. Another is planned for May 16, 2013, in Washington, DC.]

III. National Integrated Drought Information System (NIDIS) – Accelerate efforts to build a nation-wide integrated drought information system across Federal, state, and tribal agencies through NIDIS, in order to complete a national "early warning information system" for drought that



provides accurate, timely, and integrated information and provides a framework for public awareness and education about droughts.

IV. Drought Monitoring – Improve the observations, monitoring and forecasts related to drought in order to: 1) characterize physical drought conditions; and 2) assess socio-economic and environmental impacts across a range of time and spatial scales.

V. Reauthorize Congressional Legislation –

- Reclamation States Emergency Drought Relief Act of 1991 – Reauthorize the Reclamation States Emergency Drought Relief Act of 1991 in order to improve preparedness capabilities and assist affected populations and sectors. Current authorizations for this Act expired on September 30, 2012.
- Farm Bill – A new Farm Bill should include key provisions and programs relevant to drought.
- National Integrated Drought Information System (NIDIS) Act – Reauthorization of NIDIS will allow for continued progress toward a national drought

early warning system. Current authorizations for NIDIS expired December 31, 2012.

- Secure Water Act – Reauthorization of the Secure Water Act should strengthen key provisions relevant to drought.

VI. National Drought Policy – Pursue a multi-stakeholder, intergovernmental process to develop recommendations with local and private sector input for a coordinated national drought policy framework, drawing on the 2000 National Drought Policy Commission report, “Preparing for Drought in the 21st Century.”

All Opportunities

The following was identified by Forum participants as a comprehensive list of short- and long-term priority actions, organized under five key themes, that could be taken to improve drought resilience.

1. Drought & Water Supply Monitoring & Prediction

Continue efforts to improve monitoring for drought, water quantity and quality. Accelerate efforts to establish a national integrated drought information early warning system that is coordinated and integrated across federal, tribal, state and local government agencies. This system will provide information across various spatial and time scales (e.g., water basins). Specific recommendations focus on better definitions, enhanced monitoring, improved forecasts and more robust infrastructure:

- *Definitions:* Better define numerous terms, such as “drought,” including types of drought (e.g., agricultural and hydrological), as well as “onset of drought,” “end of drought,” “drought recovery,” “drought timescales,” and “drought severity,” e.g. “exceptional drought.” Definitions should include linkages between regional and national thresholds of drought severity as identified by key indices, e.g., Standard Precipitation Index (SPI), Surface Water Supply Index (SWSI), or the U.S. Drought Monitor (USDM) and impacts in various sectors. These thresholds serve as triggers for both mitigation and response actions.
- *Monitoring:* Improve drought observations and monitoring to better characterize drought conditions important for assessing socio-economic and environmental impacts across a range of time and spatial scales. This information is critical for use in policy, planning, risk assessment, and decision-making at the national, regional, state, county and local level. Enhanced collection, inte-



gration and communication of drought conditions is needed in order to provide timely, accurate, and actionable information to support preparedness, impact mitigation, and recovery. Such monitoring capabilities and uses are envisioned by the DOC-USDA MOU that was signed after the Forum. Federal agencies should coordinate their budgets to improve drought monitoring. There is a need for increased and sustainable levels of investment for such critical monitoring programs as U.S. Geological Survey (USGS) stream gaging and ground water monitoring programs, USDA Natural Resources Conservation Service (NRCS) snow survey and soil moisture networks, Remote Automated Weather Stations (RAWS) network, NOAA National Weather Service (NWS) Coop Program, U.S. Drought Monitor (USDM), NASA/USGS Landsat, and for state and tribal mesonets (a network of typically automated weather stations designed to observe mesoscale meteorological phenomena). Additionally, support should be provided for developing, communicating and sharing more useful actionable information. For example, several agencies, such as the USGS and EPA, collect water flow and chemistry data. Efforts to increase the integration of existing networks could enhance efficiencies, minimize overlap, expose gaps, and increase overall cost effectiveness. NIDIS' use of integrated information could serve as a model.

- *Forecasts:* In order to better anticipate and prepare for drought with more competence across all timescales, there is a need to improve weather and climate forecasting and our understanding of the temporal and spatial variations in forecast reliability. This will help us predict the onset of drought and when it will end, and assess the risks of drought persistence, intensification, and severity. In some cases, the optimal timeframe for advance drought forecasts is six months or more in order to be useful to sectors that must make management and policy decisions. For example, the ski industry uses forecasts for inventory planning; farmers rely on forecasting to determine when to plant, irrigate and harvest; and municipal water systems use it for multi-year water supply planning. However, long-term forecast reliability is an issue that needs to be considered. Essential drought-relevant forecasts are produced by the NWS (including the Climate Prediction Center and River Forecast Centers), the NRCS Water Supply Forecasting. In addition, the Bureau of Reclamation (BOR) and the U.S. Army Corps of Engineers (USACE) produce important reservoir



Whooping Crane

level forecasts. BOR and USACE are both providers and users of drought information.

- *Characterization of Drought Persistence and Demise:* Further develop capabilities for providing weekly updated estimates of how much precipitation would be required to end the drought. Develop a suite of probabilistic estimates, including the likelihood for receiving the amount of precipitation necessary to either ameliorate or end the drought.
- *Information on Drought Impacts:* Work across governments and the private sector through NIDIS, Regional Integrated Sciences and Assessments (RISAs) and the National Drought Mitigation Center (NDMC) to further establish and improve the systematic collection, analysis and reporting on the full range of drought impacts.
 - » Improve and expand the collection of primary, secondary and tertiary drought impact information, including impacts from insects, invasive species, and disease. A coordinated effort is needed to compile and evaluate these observations and make them easy to incorporate into planning and preparedness actions.

- » Develop new drought indicators that would integrate physical aspects of drought with environmental and socio-economic impacts.
- » Evaluate how secondary and tertiary impacts and “next generation” integrated indicators could change decisions currently tied to existing triggers.
- » Improve communication tools and processes to further public understanding of the progression of weather-to-drought-to-impacts, and of the importance of drought preparedness planning. The development of a national database of drought analogues should be developed. Providing easier-to-understand methods for conveying the progression of forecasts-weather-drought-indicators-impacts, will provide the public with useful insights and comparisons on how such progressions have occurred in the past.
- *Infrastructure/Systems:*
 - » National Integrated Drought Information System (NIDIS) – Accelerate efforts to build a nationwide

integrated drought information system, through NIDIS, by extending coverage of regional drought early warning information systems.

- » Water Use and Demand Data – Information on past and present uses is needed during drought conditions, as is data regarding how water use changes. This information can be used by resource managers to assess vulnerability and determine the effectiveness of conservation measures. The country needs a national and near real-time capability to assess regional and national water use trends during drought periods. Unfortunately, what water use data is available is difficult to obtain and evaluate in a timely manner. The Water Data Exchange (WaDE), being developed by the Western States Water Council will provide the public with a common portal to access real-time water use data from many states using common data elements. It is a starting point for developing this national capability and is a potential model for future USGS efforts. However, states still need assistance in gathering and making water use data available to support WaDE and would benefit from an assessment of national water use and demands.
- » Groundwater – Implement the National Ground Water Monitoring Network concepts developed by the USGS’s Advisory Committee on Water Information’s Subcommittee on Groundwater (which should include an enhanced groundwater climate response network with real-time capability). In addition, assess and identify groundwater systems that are sensitive to drought, or can be reserved as an emergency supply source, and use ground/surface water flow modeling to enhance knowledge and understanding of how large scale drought impacts U.S. water resources for the season and over the long-term. Assessments of aquifers following a drought are needed to understand degree of depletion and lag times in recovery.

2. Drought Communications

Establish and improve regular, real-time coordination and information sharing on the status, impacts, and prospects for drought through 2013 and beyond.

- *Use traditional and non-traditional media:* Identify and utilize a broad range of media venues and partners for reporting drought information. These communications strategies should also give particular focus to utilizing new (social) media tools and strategies.
- *Develop compelling, understandable answers to the most common questions asked during droughts:*



- » Develop methods and language to effectively engage with, and communicate drought information to policy-makers, the resource management agencies, emergency managers, and the public.
- » Anticipate and effectively address two commonly asked questions during droughts: 1) How severe is the drought from an historical perspective? 2) What steps should be taken to respond to the drought to expedite recovery and prepare for ongoing drought conditions and the next event? Ensure that timely and relevant information is pertinent to the audience to inform them of what actions they can take during a drought.
- » Communicating Uncertainty – Drought forecasts need to better communicate the temporal and spatial variations in confidence and reliability, so that the public appreciates the uncertainties inherent in the information they receive. This will ensure greater public understanding and inform public discussion.

3. Drought Preparedness Planning

In its 2000 Report, the National Drought Policy Commission strongly endorsed drought preparedness planning as a key element to reduce the impacts of drought on individuals, communities, and the environment. That theme of developing and improving drought preparedness plans was underscored during this National Drought Forum. Tools to help with preparedness planning:

- *Key Events:*
 - » National Drought Early Warning Outlook – Given current drought conditions and predictions for continued drought in 2013, a series of National Drought Early Warning outlook events should be convened to communicate and discuss projections for drought and present options for improving preparedness. The outlook events would provide information on this year's drought forecasts, and what activities should be undertaken to prepare for it. The goal is to engage the public and elected officials on drought issues and impacts, the interconnectedness of the issues, what critical water uses are, and what constitutes an "emergency." The first of these events was held in February 2013, with another planned for May 2013.
- *Key Processes:*
 - » A recommendation to improve drought planning that contained in the 2011 Western Governors' Association (WGA) report, "Improving Drought



Humpback Chub

Preparedness in the West" was further endorsed during the Forum: pursue a process with states, key federal agencies, local and tribal government representatives and stakeholder groups to present a vision and road map for drought planning. The process could be similar to the processes managed by WGA that resulted in the WGA reports "Future Management of Drought in the West" and "Creating a Drought Early Warning System for the 21st Century."

- » Drought preparedness plans should consider and be integrated with all related resource planning opportunities. For example, the Bureau of Land Management (BLM) is engaged in planning efforts to better recognize and address the interconnections between drought, wild land fire, and invasive species that affect public lands. The BLM Nevada State Office has produced a Nevada drought planning handbook to guide programmatic Environmental Assessments produced under NEPA in the context of drought management issues and impacts. This approach will enable BLM to examine multiple uses conducted on public lands and related decision-making in a manner more

sensitive to the interrelationships between drought, wildfire, and invasive species. On a larger landscape conservation scale, BLM will be conducting eco-regional assessments that consider climatic changes that could affect drought conditions to inform future multiple use land management planning efforts.

- » Need to coordinate federal drought declarations and assistance programs with drought preparedness plans to realize maximum benefit. (The process should revisit the National Drought Policy Commission Report (2000) and review the recommendations for a risk-based national drought policy framework.)
- » Triggers should be developed and included in drought preparedness plans for mitigation and other demand-responses (including prioritizing). Secondary and tertiary effects should be considered as well.
- » Drought planning should incorporate and identify sectors, population groups, and regions at greatest risk that need additional assistance, and track the vulnerability of those sectors, populations, and regions.
- » Drought preparedness planning should recognize, where appropriate, the international issues in basins shared with Mexico and Canada.
- » Effective drought preparedness planning requires intergovernmental cooperation and collaboration. A number of federal-state-tribal partnership models exist, including USACE's "Silver Jackets," and the WestFAST (Western Federal Agency Support Team) model used in the West. These models should be considered, replicated and adapted as appropriate.
- » Build upon ongoing NIDIS efforts to identify regions or water basins that are particularly vulnerable to drought and make them models for drought preparedness planning. For example, the BOR works with non-Federal partners on a cost-shared basis through its Basin Study Program to comprehensively evaluate the ability to meet future water demands within a river basin and to identify adaptation strategies. Basin Studies also include an analysis of how climate change may impact future water supplies and recommendations for adaptation strategies.
- » Drought preparedness planning should leverage and utilize existing drought planning assistance authorities, such as those utilized by the USACE and BOR. For example, through the WaterSMART Grants Program, the BOR provides cost-shared assistance on a competitive basis for water and energy efficiency improvements that save water, increase energy efficiency and the use of renewable energy in water management, address endangered species and other environmental issues, and facilitate transfers to new uses through water marketing. Funding must be used to improve infrastructure to make it more efficient and effective, and may not be used merely to repair existing facilities.
- » Experience shows that successful drought plans include the following critical elements: monitoring, early warning and information systems; impact and vulnerability assessments, and the role of climate; and appropriate mitigation and response measures (as identified in the NDMC's model drought planning process). These elements should be key components of all state, tribal, and municipal drought preparedness plans.
- » Where appropriate, drought plans should consider the use of groundwater, link drought plans and water plans, and move beyond disaster response to include long-term planning for groundwater resources.
- » Merely developing drought plans is not sufficient. To be effective, plan development, implementation and maintenance needs to be partnered with plan testing, evaluation, revision, and adaptation.
- » Pre-planning includes engaging appropriate public and private sectors regarding wildfire suppression and response activities.
- » Create a supply of native seed for planting after wildfires or other disturbances.

4. Reducing Drought Risks, Mitigating Drought Impacts and Adapting to the Future

Many actions were discussed that can be taken to build resilience to drought by reducing or avoiding drought impacts. One such mitigation opportunity identified by Kansas Governor Sam Brownback pertained to reservoir storage reduced by siltation. In describing the issue, the Governor stated, "The value of our federal reservoirs has once again been reinforced during this year's drought: Two thirds of Kansas population depends on Federal reservoirs for water supply, and sixty percent of Kansas power production depends on federal reservoirs. Yet, because of siltation, these reservoirs have been losing important storage capacity. It is vital to reclaim now the lost storage of our federal reservoirs for future drought situations."

These actions were proposed to improve drought preparedness and mitigate drought impacts:



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- *Tools and Training:*
 - » Provide a comprehensive and integrated 'Directory of Government Drought Programs' that is easily accessible and regularly updated.
 - » Organize and facilitate virtual drought scenario exercises (table-top exercises) for various levels of government.
 - » Consistent with the DOC–USDA MOU signed following the Forum, establish an inventory of past mitigation applications that can serve as a guide of 'best practices' to address similar drought situations in the future.
- *Synergies and Integrations:*
 - » Crop Insurance –
 - Need to better communicate to farmers key insurance-related practices. For example, crop insurance policies do not require continued irrigation when crops are past the point of beneficial use, in order to collect crop insurance.
 - Provide insurance options for deficit or limited irrigated crops.
 - Expand or replicate crop insurance for livestock, fruits and vegetables, and specialty crops.
 - » Provide appropriate incentives to producers that will encourage them to plant low-water crops, e.g. sorghum, that could be used to produce renewable biofuels instead of corn for ethanol production, which requires relatively more water.
 - » Manage headwaters to help mitigate impacts from drought. Managing the headwaters facilitates the quality and quantity of water available, and expands water management options. For example, work cooperatively to implement policies that are intended to prevent or reduce future sedimentation in reservoirs.
- » Increase efficiency of municipal & industrial water supply infrastructure, particularly in the interconnection between systems. Regulations that are barriers to the interconnections should be identified, along with possible existing model legislation that can allow for increased interconnections. Increased efficiency could also be attained by utilizing opportunities such as upgrading aging systems to reduce water losses
- » Work in partnership with the USACE, other relevant federal agencies, states, tribes and private entities to regain needed reservoir water storage capacity and maximize the benefits of reservoirs (consistent with the reservoir project purpose and in accordance with Water Control Plans and Manuals). These efforts and partnerships should explore alternative approaches to financing and cost-sharing.
- » Work with states, tribes and local water users to identify priority water basins or projects that either have been, or will be severely affected by drought, in order to focus mitigation strategies for 2013.
- » Work collaboratively to promote drought adaptation measures. In some cases, these may take time to implement, possibly years: Water recycling/reuse, water conservation measures (Water-Sense), artificial recharge (e.g., Aquifer Storage and Recovery (ASR), and/or stormwater capture for reuse and/or infiltration, where allowable by applicable law.
- » Reduce the degradation of water quality that can result from drought and wildfire by undertaking timely restoration projects on damaged landscapes.

- » Restore and maintain resilient landscapes to manage related environmental impacts from wildfire.
- » Engage federal, tribal, state and local authorities to support fire adapted communities. Federal, tribal, state and local agencies work collaboratively to maintain a strong wildfire suppression capability to manage wildfire impacts.

5. National Investments and Opportunities

Drought has imposed significant costs to the U.S. In the past 30 years, the nation has experienced a growing number of billion-dollar drought disasters. The costs of the 2012 drought will surpass \$50 billion. The costs of Hurricane Sandy exceed \$70 billion. Both droughts and hurricanes impose large and often long-term economic costs to society that will continue to challenge our collective resources to mitigate.

Consequently, a National Drought Forum panel consisting of Congressional Committee Staff and the Congressional Research Service experts identified and discussed a number of opportunities to improve drought preparedness that require Congressional action. Additionally, Secretary of Agriculture Vilsack called for a new Farm Bill in order to provide producers a safety net and a level of certainty around planning decisions, as well as the tools for planning and mitigating natural disasters imposed by drought. Forum attendees discussed the following congressional actions:

- *Reauthorize or enact the following statutes:*
 - » Water Resources Development Act (WRDA)– Congress should consider a joint proposal from Kansas, Texas and Oklahoma that seeks to improve storage pricing, and adds flexibility to non-federal in-kind contributions. Additionally, support should be provided to existing authorities under WRDA that allows the USACE to provide drought preparedness planning assistance.
 - » Farm Bill – A new Farm Bill should be passed and enacted that includes key provisions and programs relevant to drought, and provides drought preparedness and mitigation tools to assist the agricultural and conservation sectors.
 - » The Reclamation States Emergency Drought Relief Act – Congress should reauthorize this legislation and fund it to enable the Bureau of



Reclamation to provide drought preparedness planning assistance as authorized by the Act. This legislation expired on Sept 30, 2012. Under this Act, the Bureau of Reclamation had the authority to engage in construction, management, and conservation activities that minimize losses and damages resulting from drought conditions, limited to temporary facilities except for wells, which may be permanent. This authority included the deepening of existing wells. This authority only extended to the 17 Western Reclamation states and Hawaii. Also, under the Act, the Bureau had the authority to conduct studies to identify opportunities to conserve, augment and make more efficient use of water supplies available to Reclamation projects and use of Indian water resource developments. Reclama-



tion also was authorized to prepare or participate in the preparation of Contingency Plans for the prevention and mitigation of drought impacts.

- » The National Integrated Drought Information System Act (NIDIS) – Including support that will allow NIDIS to expand regional pilots, and eventually fulfill the mandate in the Act to establish a ‘national’ drought early warning and integrated information system. Authorization for this Act expired on December 12, 2012.

- *Funding for Water Projects:*

- » Provide funding to allow water utilities to diversify their water sources and provide interconnections between water systems, and invest in recycling, reuse, and water reclamation systems which will result in longer-term resiliency.

- » Increase funding for State Revolving Funds (SRF) under the Clean Water Act (CWA) and Safe Drinking Water Act (SDWA). Current SRF funding is in decline.
- » Increase funding for WaterSMART and Title XVI grants that can be used to increase water projects’ efficiencies and water conservation measures.
- » Increase funding through the ‘Water Infrastructure Financing and Innovation Act’ for water conservation and efficiency improvements.
- Establish a national drought policy framework:
 - » As recommended in the 2000 report of the National Drought Policy Commission, this framework should include federal, tribal and state agencies and others, and should be based on drought risk reduction.
 - » Such a national policy could include the establishment of a Rapid Assessment and Rapid Outreach Program. The goal of the program would be to provide (a) technical assistance for assessment of emerging drought, and (b) communication and coordination assistance, to increase understanding of emerging situations and preparedness for potential impacts, through dialogue between key decision makers, scientists, and stakeholders.
- *Invest in science:*
 - » Current models project drought by using historical data. Research is needed to better understand the linkages between drought severity, duration and changes in climate, which can lead to better forecasting.
 - » Invest in models that help predict long-range secondary and tertiary impacts to flora and fauna, and the problem of invasive species that adversely affect the environment.

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Appendix 2

Agenda

National Drought Forum:

The 2012 Drought and U.S. Preparedness in 2013 and Beyond

December 12-13, 2012

Hall of the States

Washington, DC



National Drought Forum

“The 2012 Drought and U.S. Preparedness for 2013 and Beyond”

December 12-13, 2012

Hall of the States

Washington, D.C.

SSO Meeting Rooms 233-235

Wednesday, December 12

- 8:30 a.m. Continental Breakfast Available
- 9:00 **Welcome and Introductions; Forum Goals & Objectives** – Forum Co-Chairs: Donald A. Wilhite, Professor of Applied Climate Science, University of Nebraska’s School of Natural Resources; Robert Detrick, Assistant Administrator, NOAA Office of Oceanic and Atmospheric Research
- 9:15 **Drought Information: Forecasting and Monitoring the 2012 Drought, and Looking Ahead to 2013** – This panel of scientists will discuss the intensity and scope of the 2012 drought, and the outlook for continued drought in 2013.
- Moderator:* Eric Evenson, USGS

Speakers:

- Brad Rippey, Office of the Chief Economist, USDA – to discuss the U.S. Drought Monitor and evolution of 2012 drought and its impacts
- Ed O’Lenic, NOAA CPC – to discuss the Seasonal Drought and Climate Outlooks
- Mike Strobel, USDA-NRCS – to discuss streamflow, snowpack and soil condition outlooks

10:00

2012 Drought Impacts and Response – *Federal Perspective*

This panel of federal agency representatives will discuss the response to the drought in 2012, providing important context for the Forum by addressing such topics as, the role that drought information had in informing response actions, intergovernmental coordination on response, the role of timely federal assistance, and drought planning activities that were executed.

Moderator: Mark Svoboda, National Drought Mitigation Center

Speakers:

- Colleen Callahan, Illinois Director, USDA Rural Development; and USDA’s Federal Disaster Recovery Coordinator in Response to 2012 Drought
- Dionne Thompson, Chief of Congressional and Legislative Affairs, Bureau of Reclamation
- Steve Guertin, Deputy Director for Policy, U.S. Fish & Wildlife Service
- Chandra Pathak, U.S. Army Corps of Engineers, Hydrology and Hydraulics
- Deborah Ingram, Assistant Administrator for Recovery, FEMA
- Kit Muller, Landscape Initiatives Coordinator, BLM

11:10

Break

11:20

2012 Drought Impacts and Response –*Non-Federal Perspective*

This panel of private sector, state, tribal and local government representatives will discuss the response to the drought in 2012, providing important context for the Forum by addressing such topics as, the role that drought information had in informing response actions, intergovernmental coordination on response, the role of timely federal assistance, and drought planning activities that were executed.

Moderator: Diane Duff, Director, Southern Governors Association

Speakers:

- Dennis Today, South Dakota State Climatologist
- Sophi Beym, Emergency Manager, Pueblo of Acoma, Public Safety Department
- Kelly Davis, Director of Research, SnowSports Industries America
- Colin Woodall, Vice President, Government Affairs, National Cattlemen’s Beef Association

12:20

Lunch – Box lunches provided

Keynote Speaker: Bob Perciasepe, Deputy Administrator, EPA

1:00

PANEL DISCUSSION: Preparing for 2013

This panel of federal, state & local government officials will discuss the implications of the seasonal climate outlooks as we enter the winter snowpack season, review and share information on key drought indicators and triggers, and opportunities for drought information to inform response strategies to respond to evolving and future drought conditions and impacts.

Moderator: Roger Pulwarty, Director of NOAA’s NIDIS Office

Panelists:

- Chuck Bohac, Tennessee Valley Authority
- RADM Scott Deitchman, Asst Surgeon General & Assoc Director for Environmental Health Emergencies, Centers for Disease Control & Prevention
- Robert Flider, Director, Illinois Department of Agriculture
- David Torres, Economist, El Paso Water Utilities

2:00 **Breakout Discussions – Preparing for 2013**

What did we learn from 2012; and how are we subsequently preparing for 2013? Breakout groups will be organized around the following economic sectors:

- Agriculture
- Energy
- Wildfire
- Municipal and Industrial Water Supply; and Public Health
- Tourism; and Natural Resources

3:00 **Break**3:15 **Building a National Integrated Drought Early Warning Information System**

This panel will discuss development of the national integrated drought early warning information system, including the key partnerships and collaboration necessary to collect and integrate data, as well as communicate information on forecasts and impacts.

Moderator: Shaun McGrath, NOAA-NIDIS Advisor

Speakers:

- Roger Pulwarty, NOAA's National Integrated Drought Information System Office
- Mike Hayes, National Drought Mitigation Center
- Kent Lanolos, Director, Strategic Data Acquisition and Analysis, RMA-USDA
- Tony Willardson, Director, Western States Water Council

4:15 **Coordination with Federal, Tribal, State, and Local Governments**

A critical component of preparing and planning for droughts, and responding to them when they occur, are strong and effective coordination partnerships within and across federal, tribal, state, local governments, and the private sector. For example, such partnerships help to ensure that a national drought early warning information system engenders better informed and more timely decisions leading to reduced impacts and costs. This panel will discuss how this cooperation and coordination is working and how those efforts may be improved.

Moderator: Mark Shafer, SCIPP (Southern Great Plains response)

Speakers:

- Butch Blazer, Deputy Under Secretary for Natural Resources & Environment, USDA
- Tom Littlepage, Alabama Office of Water Resources
- Nolan Doesken, Colorado Climate Center
- Josh Barnes, Economic Development Administration; National Coordinator for the Economic Recovery Support Function (RSF) under the National Disaster Recovery Framework

5:15 **Open Discussion with All Attendees**

5:30 **Adjourn**

Thursday, December 13

8:30 a.m. Continental Breakfast Available

9:00 **Reconvene – Review Day’s Agenda and Objectives** – Co-Chairs: Don Wilhite &
Robert Detrick

9:15 **Key highlights and findings from breakout groups**

9:45 **U.S. Drought Readiness –Improving Resilience (Panel 1)**

Keynote Speaker: The Honorable Sam Brownback, Kansas Governor

Governor Brownback will discuss the impacts from the current drought in the State of Kansas, and will provide the insights from a Governor on his state’s efforts to prepare for, and respond to, drought disasters.

10:30 **Break**

10:45 **U.S. Drought Readiness – Improving Resilience (Panel 2)**

This panel of high-ranking federal agency officials will provide prepared remarks, discussing current federal authorities and programs relevant to drought that they oversee, as well as to consider opportunities and options for better coordinating and integrating federal programs and improving U.S. drought readiness.

Moderator: Robert Detrick, Assistant Administrator, NOAA Office of Oceanic & Atmospheric Research

Speakers:

- John Tubbs, Deputy Assistant Secretary for Water and Science, Department of the Interior
- Michael Scuse, USDA Under Secretary for Farm and Foreign Agriculture Services
- Ann Mills, USDA Deputy Under Secretary for Natural Resources and the Environment
- James Dalton, Chief of Engineering and Construction, USACE
- Jay Jensen, Associate Director for Land and Water Ecosystems, White House Council on Environmental Quality (CEQ)

12:15 **Lunch** – Box lunches provided

12:45 **USDA Efforts on Drought Preparedness and Response**

Keynote Speaker: The Honorable Tom Vilsack, Secretary, U.S. Department of Agriculture

Secretary Vilsack will discuss the impacts from drought on agriculture and natural resources and will describe efforts his Department is taking to improve drought preparedness and response. The Secretary will be joined by Dr. Kathryn Sullivan, Assistant Secretary of Commerce for Environmental Observation and Prediction and Deputy Administrator for the National Oceanic and Atmospheric Administration (NOAA), to discuss USDA – Commerce collaboration.

1:15 **Congressional Panel**

This panel of key Congressional Committee leaders will discuss how the new Congress may approach U.S. drought readiness and improving resilience.

Moderator: Betsy Cody, Congressional Research Service

Speakers:

- Sara Tucker, Senate Energy and Natural Resources
- Tina May, Senate Agriculture
- Tara Rothschild, House Science, Space and Technology

Congressional Panel Speakers cont.

- Jon Pawlow, House Transportation and Infrastructure
- Kelvin Stroud, Senator Mark Pryor

2:15 Breakout Discussions

We will again go into smaller group discussions to facilitate input and dialog from all forum attendees. The groups will be asked to make recommendations with actionable items for improving drought readiness and resilience.

3:00 Closing Discussion to Identify Key Recommendations to Improve Drought Readiness – led by Co-Chairs and others

This last exchange among all meeting attendees will provide a final consideration of the key opportunities and needs relevant to U.S. drought readiness. We will identify key recommended actions and next steps that will improve drought readiness and national resilience.

3:45 Adjourn

Appendix 3

Speaker Bios

December 11, 2012

National Drought Forum

“The 2012 Drought and

U.S. Preparedness for 2013 and Beyond”

December 12-13, 2012

Washington, D.C.

Forum Co-Chairs

Donald A. Wilhite, Professor of Applied Climate Science, University of Nebraska’s School of Natural Resources

Donald Wilhite founded the National Drought Mitigation Center at the University of Nebraska–Lincoln in 1995 and served as its director until 2007, when he became director of UNL’s School of Natural Resources. He has worked with numerous state and federal agencies, foreign governments, and regional and international organizations on climate- and drought-related issues. Wilhite’s research and outreach activities have focused on a wide range of drought issues including monitoring, planning, mitigation and policy and the use of climate information in decision-making. Wilhite joined UNL in 1977. He is the recipient or co-recipient of more than \$20 million in grant funding. Wilhite is author or co-author of more than 130 journal articles, monographs, book chapters and technical reports. He is editor or co-editor of numerous books, including *Drought and Water Crises: Science, Technology, and Management Issues* (2005); *From Disaster Response to Risk Management: Australia’s National Drought Policy* (2005); *Drought: A Global Assessment* (2000); *Coping with Drought Risk in Agriculture and Water Supply Systems: Drought Management and Policy Development in the Mediterranean* (2009); and the book series, *Drought and Water Crises* (2009).

Robert Detrick, Assistant Administrator, NOAA Office of Oceanic and Atmospheric Research

Dr. Robert Detrick is the Assistant Administrator (AA) of NOAA’s Office of Oceanic and Atmospheric Research (OAR) and chair of the NOAA Research Council. He is responsible for daily operations and administration of NOAA’s research enterprise including a network of research laboratories and the execution of NOAA programs including the Climate program, National Sea Grant, and Ocean Exploration. He joined NOAA in February 2012.

A marine geophysicist, Dr. Detrick has extensive experience in marine science, technology, and marine operations. Before joining NOAA, Dr. Detrick was Director of the National Science Foundation’s Division of Earth Sciences. He joined NSF in 2008 following more than 20 years at Woods Hole Oceanographic Institution (WHOI), where he was a Senior Scientist Vice President for Marine Facilities and Operations.

Dr. Detrick’s research focused on aspects of marine geology. He lists more than 100 scientific publications on the seismic structure of mid-ocean ridges and oceanic crust, the size, depth, and properties of ridge crest magma chambers; and the nature of mantle flow beneath mid-ocean ridges and relationship to ridge segmentation and axial topography.

A Fellow of the American Geophysical Union, Dr. Detrick received the A. G. Huntsman Medal in 1996 which honors “marine scientists who have had and continue to have a significant influence on the course of marine scientific thought.”

He has participated in more than 30 major oceanographic cruises, 18 as Chief Scientist or Co-chief Scientist. He was Co-Principal Investigator for WHOI's ocean bottom seismic instrumentation laboratory which builds and operates ocean bottom seismometers for the U.S. National Ocean Bottom Seismic Instrumentation Pool. He was Senior Principal Investigator on WHOI's NSF-funded project to build a replacement for WHOI's Deep Sea Research Vessel *Alvin*.

Dr. Detrick has served on and chaired committees and panels for various international and national organizations including the RIDGE Steering Committee (Chair from 1992-1995), the Joint Oceanographic Institutions for Deep Earth Sampling (JOIDES) Executive Committee of the Ocean Drilling Program (Chair from 1996-1998) and the NSF Geosciences Advisory Committee (Chair 2004-2005). He was a member of the Board of Governors of Joint Oceanographic Institutions (JOI) (1995-2007) and chaired the JOI Board from 2002-2004. He is a Past President of AGU's Tectonophysics Section and is chair of the International Continental Drilling Program Assembly of Governors.

He holds a bachelor's degree in geology and physics from Lehigh University (1971), a master's degree from the University of California, San Diego in marine geology (1974), and a doctorate from the Massachusetts Institute of Technology/WHOI Joint Program in Oceanography (1978).

Wednesday, December 12

Drought Information: Forecasting and Monitoring the 2012 Drought, and Looking Ahead to 2013

Brad Rippey, Office of the Chief Economist, USDA

Brad Rippey is an agricultural meteorologist with USDA's Office of the Chief Economist, and the managing editor of the Weekly Weather and Crop Bulletin, a cooperative effort between the National Oceanic and Atmospheric Administration (NOAA) and USDA. Before joining USDA in 1998, he spent eight years with the National Weather Service and two years with NOAA's Satellite, Data and Information Service. Rippey is also a columnist for Weatherwise magazine. He is a 1988 graduate of Penn State University.

Ed O'Lenic, NOAA CPC

Edward Alan O'Lenic is Chief of the Operations Branch of the National Weather Service's Climate Prediction Center (CPC) at the National Center for Environmental Prediction (NCEP) in College Park, Maryland. He is responsible for the National Weather Service's operational extended- and long-range forecasts, for directed research to innovate and improve forecast products, and for outreach to users. He has lectured on long-range forecasting around the world.

Mr. O'Lenic has published papers on sea ice movement and prediction, atmospheric modeling, tropical disturbances, teleconnections, predictability, statistical prediction methods, forecast performance, new forecast methods, and operational public products including the U.S. Hazards Assessment, and forecast methods for 6-10 days, week-2, 1-month, and 3-months.

Mr. O'Lenic is the recipient of the Department of Commerce Gold, Silver and Bronze Medals. A Fellow of the American Meteorological Society (AMS), he is Chair (2008-present) of the Committee on Climate Services, a member of the AMS Board on Enterprise Communication, and a Past Member of the Committee on Climate Variability and Change. He received Bachelors (1972) and Masters of Science (1976) degrees in Meteorology from the Pennsylvania State University. He is a native of North Charleroi, Pennsylvania.

Mike Strobel, USDA-NRCS

Mike Strobel is the Director of the USDA-NRCS National Water and Climate Center and the Program Manager for the Snow Survey and Water Supply Forecasting Program. He oversees the SNOTEL (Snow Telemetry) network and the Soil Climate Analysis Network (SCAN).

2012 Drought Impacts and Response – Federal Perspective

Colleen Callahan, Illinois Director, USDA Rural Development; and USDA's Federal Disaster Recovery Coordinator in Response to 2012 Drought

Colleen Callahan is the Illinois Director for USDA Rural Development. Currently she is serving as the Federal Disaster Recovery Coordinator for Drought.

Dr. Chandra S. Pathak, U.S. Army Corps of Engineers

Dr. Chandra S. Pathak, Ph.D., P.E., D.WRE, F.ASCE, has a distinguished career with over 33 years of experience in wide ranging areas of water resources engineering that included surface and ground water hydrology and hydraulics, stormwater management, wetland, water quality, drought management, GIS, and hydrology, hydraulic and water quality computer models. Currently, he is a principal engineer at the US Army Corps of Engineers, headquarters at Washington, DC. Before that he was a principle engineer at the South Florida Water Management District for twelve years. He is an adjunct professor at Florida Atlantic University and Florida International University. Previously, he was a practicing consulting engineer in the United States for over twenty years. He obtained a bachelor of technology in 1976 and a master of engineering in water resources in 1978 and a doctorate in hydrologic engineering in 1983 from Oklahoma State University. Since 2006, he has been serving as an associate editor of Journal of Hydrologic Engineering. He has numerous presentations, speeches, and technical papers to his credit in the areas of water resources engineering. In 2007, he was awarded Diplomat of Water Resources Engineering and Fellow Member of the American Society of Civil Engineers (ASCE).

Dionne Thompson, Chief of Congressional and Legislative Affairs, Bureau of Reclamation

Prior to moving into her current position, Ms. Thompson served as the Chief of Congressional and Legislative Affairs for three years at the Bureau of Reclamation. Ms. Thompson began her career in Washington, D.C. in 1993 when she was staff counsel to Senator Dale Bumpers on the U.S. Senate Energy and Natural Resources Committee, Subcommittee on Public Lands, National Parks and Forests. In 1995 and 1996 she provided counsel to Sen. J. Bennett Johnston covering a wide range of issues including appropriations, environmental and natural resource issues.

Ms. Thompson worked as a senior energy and environmental aide to Sen. Mary L. Landrieu of Louisiana from 1997 to 1999, and again as legislative director in 2008. She has also been an attorney in private practice, as well as in the U.S. Department of the Interior's Office of the Solicitor. Ms. Thompson is originally from Shreveport, LA, and has lived in the Washington, D.C. metro area for nearly 20 years. She received her B.A. from Harvard University and has a J.D. from the University of Virginia School of Law.

Steve Guertin, Deputy Director for Policy, U.S. Fish & Wildlife Service

Steve Guertin leads Service operations in Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah and Wyoming. He strongly believes in landscape scale conservation partnerships and serves as a member or Chairman on the Inter-agency Grizzly Bear Committee, Prairie Pothole Joint Venture, Missouri River Basin Interagency Roundtable, and Upper Colorado River Recovery Implementation Committee, among several others. He supports State conservation efforts by serving on the Service Regulations Committee to set the annual framework for migratory bird harvest; and works with the States on the Joint Federal/State ESA Task Force and the Joint Federal/State Policy Task Force to resolve Federal assistance and Endangered Species Act issues. Under the America's Great Outdoors Initiative, and building on lessons learned in areas like Montana's Crown of the Continent, the Region has pursued landscape scale conservation by forging working landscape partnerships. This includes formally establishing the 2.0 million acre Dakota Grasslands Conservation Area; the 1.1 million acre Flint Hills Legacy Conservation area; doubling the size of the Rocky Mountain Front Conservation Area and the Blackfoot Valley Conservation Area, and creating the new Swan Valley Conservation Area.

As part of a national strategy, he is involved in standing up six Landscape Conservation Cooperatives that address wildlife adaptation in an environment of climate change, energy development, water challenges, fire and invasive species. In the Great Northern LCC, for example, he has partnered with the National Park Service and the Province of British Columbia to set trans-boundary conservation priorities at a landscape scale.

Before moving to Colorado in 2007, he led national level efforts to prepare, justify and execute the Service's \$2.3 billion annual budget, and completed operations assignments in several Service programs and the Alaska Region. During his nine year tenure in the Department of the Interior he recommended funding and policy options for the Service and the Bureau of Land Management. He previously served for eight years in the United States Marine Corps in Hawaii, California, Virginia, and overseas. He earned a bachelors degree from Norwich University in Vermont and a Master's of Public and International Affairs from the University of Pittsburgh and was a Senior Executive Fellow at the Harvard Kennedy School. Steve and his wife, Irene, live in Colorado and have two young children.

Deborah Ingram, Assistant Administrator for Recovery, FEMA

Deborah Ingram's public service career spans more than 30 years and includes broad experience in a variety of programs at the federal and local government levels. For more than ten years, Deborah Ingram has served in a variety of senior positions in

Federal Emergency Management Agency's (FEMA) Headquarters. She is currently the Assistant Administrator for the Recovery Directorate. In this capacity, Ms. Ingram has responsibility for leadership and oversight of mandated federal disaster assistance programs that support individuals and communities affected by disasters in their efforts to recover, including individual assistance, public assistance, long-term community recovery, and mass care and voluntary agency coordination. These programs, constitute the majority of the resources provided by the Federal Government through FEMA to directly address the short, medium, and long-term impacts of a disaster on individuals and communities.

Previously, Ms. Ingram held a variety of senior positions in FEMA's Federal Insurance and Mitigation Directorate, where she was responsible for programs that assist states, tribes and local communities to reduce their risk to natural hazards and disasters. Among her many achievements, Ms. Ingram was instrumental in leading the unification of hazard mitigation grant programs, building strong relationships with FEMA's partners and during the Summer of 2010, she provided key leadership in development and support of the Integrated Services Team during the aftermath of the Deepwater Horizon oil spill.

Ms. Ingram was appointed to the Federal Senior Executive Service in August 2007. Prior to coming to FEMA, Ms. Ingram spent eleven years at Environmental Protective Agency (EPA), where she held a variety of senior and management positions in strategic planning, and administration and resources management. Ms. Ingram started her public service career working at the local government level in North Carolina and later in Virginia, where she managed and implemented a variety of federally funded grant programs. Ms. Ingram holds an M.A. in Public Administration from the University of Virginia, an M.A. in Psychology from George Mason University and a B.S. in Psychology from East Carolina University.

Kit Muller, Landscape Initiatives Coordinator, BLM

Kit Muller was born and raised in Montana. He did his undergraduate work in social anthropology at Harvard University and his graduate work in economics and public policy at the University of California at Berkeley. He has worked for the Bureau of Land Management for over 30 years, primarily in the Washington Office. He is currently guiding and coordinating the BLM's efforts to more systematically understand and address landscape-scale changes in the American West including climate change, wildland –fire, invasive species, urban growth and industrial development. Prior to working for the BLM, Kit worked for a member of the U.S. Congress, the State of California, and a number of national and regional non-governmental organizations.

2012 Drought Impacts and Response –Non-Federal Perspective

Mark Schouten, Administrator, Iowa Homeland Security and Emergency Management Division

Mark Schouten (Scow` ten) is the Administrator of the Iowa Homeland Security and Emergency Management Division of the Iowa National Guard. Prior to taking this position Schouten was an Assistant Iowa Attorney General, elected Iowa county attorney, and private practice attorney for thirty-five years.

Dennis Todey, South Dakota State Climatologist

Dr. Dennis Todey has been the state and extension climatologist for South Dakota since 2003. He is also an Associate Professor in the Department of Agricultural & Biosystems Engineering at South Dakota State University working with extension and the ag experiment stations. He directs an automated weather stations network to help supply more information to people directly and the through the South Dakota climate web site. He has conducted research on long term climate trends and climate-yield relationships throughout the Midwest. He is a frequent speaker on long range outlooks, climate trends and general climate, variability and change information. He is the current past-president of the American Association of State Climatologists. Degrees Awarded:

- BS 1988 Iowa State University Meteorology
- MS 1990 South Dakota School Mines & Technology Meteorology
- PhD 1995 Iowa State University Agricultural Meteorology

Sophi Beym, Emergency Manager, Pueblo of Acoma, Public Safety Department

Ms. Sophi Beym is a member of the Navajo (Dine) Nation and is currently serving as the Emergency Manager for the Pueblo of Acoma in NM. Her responsibilities include assessing the emergency management program for NIMS compliance and development of emergency management plans for the Pueblo. And, she serves as an instructor for Emergency Management Institute, Tribal Curriculum.

Prior to her position at Acoma, Ms. Beym served as State Hazard Mitigation Officer (SHMO) under the New Mexico Department of Homeland Security and Emergency Management. As SHMO, Ms. Beym worked with Tribal, Federal and local agencies to promote life/safety fundamentals using mitigation practices as primary tool in the State of New Mexico. Prior to becoming the SHMO, Ms. Beym was the Emergency Manager with the Bishop Paiute Environmental Management office for four years in Bishop, California. Ms. Beym is also the former Director of the Tribal Emergency Management Systems (TEMS) Foundation in Mesa, AZ, where she assisted Tribes with development of Emergency Management programs, focusing on Pre-Disaster Mitigation grants, plans and projects throughout Indian Country. Recently, Ms. Beym was appointed by Secretary of Interior Ken Salazar to serve on the National Geospatial Advisory Committee (NGAC).

Ms. Beym holds a Masters of Advanced Study Degree in Geographic Information Systems from Arizona State University and a Bachelor of Interdisciplinary Studies with concentrations in Environmental Geography and American Indian Studies from Arizona State University.

Kelly Davis, Director of Research, SnowSports Industries America

Kelly has spent the past 6 years working as SnowSports Industries America's Director of Research. In past lives, she conducted research on everything from drop-out prevention in high schools to trends in terrorism, she has patented mathematical models, and built economic simulations that continue to accurately predict trends. Kelly has worked for the Government in various capacities, was the COO of an Internet start-up in NYC, built her own research and consulting firm, and worked in private sector intelligence prior to her tenure at SIA.

Colin Woodall, Vice President, Government Affairs, National Cattlemen's Beef Association

Colin Woodall is Vice President of Government Affairs for the National Cattlemen's Beef Association here in Washington, DC. He serves as the chief lobbyist for the over 147,000 members of the association who represent all components of the chain which gets beef to your table. He is a native of Texas and has worked both on Capitol Hill and in the private sector.

Lunch Keynote Speaker

Bob Perciasepe, Deputy Administrator, EPA

With his appointment by President Obama in 2009, Bob Perciasepe returned to the U.S. Environmental Protection Agency to serve as Deputy Administrator—the nation's second ranking environmental official and the agency's chief operating officer. In this role, he continues a career spanning nearly four decades as one of the nation's leading environmental and public policy figures. An expert on environmental stewardship, advocacy, public policy, and national resource and organizational management, Perciasepe is widely respected within both the environmental and U.S. business communities.

His extensive experience includes service both inside and outside of government. He served as a top EPA official in the administration of President Bill Clinton, who appointed him, first, to serve as the nation's top water official and later as the senior official responsible for air quality across the U.S. Prior to being named to his current position, he was chief operating officer at the National Audubon Society, one of the world's leading environmental organizations. He has also held top positions within state and municipal government, including as Secretary of the Environment for the State of Maryland and as a senior official for the City of Baltimore. Perciasepe holds a Bachelor of Science degree in Natural Resources from Cornell University and master's degree in planning and public administration from the Maxwell School of Syracuse University. He and his wife have two adult daughters.

Panel Discussion: Preparing for 2013

Chuck Bohac, Tennessee Valley Authority

Chuck Bohac received a BS in Civil Engineering from Montana State University and an MS and PhD in Civil Engineering and Hydrology from the University of Arizona. Chuck began his career working on water supply and wastewater projects in California, Maryland, and Ohio. For the last 35 years he has undertaken a variety of environmental, energy, and water resource assignments for the Tennessee Valley Authority. He is a registered Professional Engineer in Virginia, Kentucky, and Tennessee. He is also a Certified Ground Water Professional.

RADM Scott Deitchman, Asst Surgeon General & Assoc Director for Environmental Health Emergencies, Centers for Disease Control & Prevention

Scott Deitchman directs the Office of Environmental Health Emergencies in the National Center for Environmental Health, which is part of the Centers for Disease Control and Prevention in Atlanta, Georgia. He has directed CDC's response to various environmental emergencies including the drought, the 2011 nuclear power plant disaster in Fukushima, Japan, and the 2010 Deepwater Horizon oil spill. He is a physician specializing in occupational and environmental medicine, and holds the rank of rear admiral in the United States Public Health Service.

Robert Flider, Director, Illinois Department of Agriculture

Citing his work as a "tireless, effective leader for rural farming communities," Governor Pat Quinn appointed Robert F. Flider as director of the Illinois Department of Agriculture Feb. 15, 2012. The appointment enabled Flider, a former lawmaker and mayor in east central Illinois, to continue a career dedicated to public service.

Flider served in the Illinois House of Representatives from 2003 through 2011. During his tenure, he worked on a number of agricultural issues, serving on the House Agriculture and Conservation Committee and the Ethanol Production Oversight Committee. Flider was named an "Agriculture Certified Legislator" by the Illinois Farm Bureau in 2004, and was presented the organization's "Friend of Agriculture" award in 2006, 2008 and 2010.

Prior to his election as state representative, Flider served two terms as mayor of Mt. Zion and worked as Director of Regulatory Affairs for Illinois Power. Most recently, however, he was employed as Director of Broadband Impact, promoting technology access in rural Illinois communities at the not-for-profit Partnership for a Connected Illinois.

Flider, an Eastern Illinois University graduate, was "humbled" by his appointment as agriculture director and vows to serve as a "goodwill ambassador and number one advocate for the farm families, communities and companies that make our state great".

David Torres, Economist, El Paso Water Utilities

Torres is in-charge of economic research and financial analysis for El Paso water Utilities. He worked for El Paso Electric as their economist in charge of load and financial planning forecasts and served as a witness on rate cases in New Mexico and Texas. He earned his masters of science in Economics in 2002 from the University of Texas at El Paso where he also teaches economics and finance courses. He is a co-author of "Borderplex Economic Change," "Milkshake Prices, International Reserves and the Mexican Peso," and forthcoming "Short Term Electricity Demand Forecast Accuracy."

Building a National Integrated Drought Early Warning Information System

Roger Pulwarty, NOAA's National Integrated Drought Information System Office

Dr. Roger S. Pulwarty is the director of the multi-agency National Integrated Drought Information System at NOAA. Roger's research and publications focus on climate and weather impacts assessment, risk management and decision-making, and regional climate and weather services in the United States, Latin America and the Caribbean. Roger is a lead author on the 2007 IPCC Report on Impacts, Adaptation and Vulnerability, the UN International Strategy for Disaster Reduction (2011) and the IPCC Special Report on Extremes (2012). He is a Convening Lead Author on Adaptation in the forthcoming IPCC Fifth Assessment Report Working Group II.

Roger has acted in expert advisory capacities to several U.S. and international science and development agencies, including the Western US Governors, Native American communities, the Caribbean Economic Community (CARICOM), the governments of Fiji, Portugal, Venezuela, Chile, the Organization of American States, the UNDP, UNEP, and the InterAmerican Development and World Banks. Roger has served on committees of the U.S. National Academy of Sciences and has provided testimonies before the U.S. Congress, on climate, adaptation and water resources. He is a member of the WMO Expert Committee on Climate, Water and Food Security and is the co-editor of "Hurricanes: Climate and Socio-Economic Impacts" Springer (1997) which was re-issued in paperback in 2012.

Mike Hayes, National Drought Mitigation Center

Dr. Michael Hayes is currently the Director for the National Drought Mitigation Center (NDMC) located within the School of Natural Resources at the University of Nebraska-Lincoln. He became the NDMC's Director in August 2007 and has worked at the NDMC since 1995. The NDMC now has 16 faculty and staff working on local, tribal, state, national, and international drought-, climate-, and water-related issues. Dr. Hayes' main interests deal with drought monitoring, planning, and mitigation strategies. Dr. Hayes received a Bachelors Degree in Meteorology from the University of Wisconsin-Madison, and his Masters and Doctoral Degrees in Atmospheric Sciences from the University of Missouri-Columbia.

Kent Lanclos, Director, Strategic Data Acquisition and Analysis, RMA-USDA

Dr. Kent Lanclos is the Director of Strategic Data Acquisition and Analysis with the USDA Risk Management Agency. He previously served on the staff of the RMA administrator as a policy analyst and advisor, and as the Senior Underwriter for the Federal crop insurance program. Before joining RMA, he was the Assistant Director of Economic Services for the National Cotton Council, the primary trade association for the US cotton industry. Dr. Lanclos received his PhD in Agricultural Economics from Purdue University in 1994.

Tony Willardson, Director, Western States Water Council

Tony Willardson was named as Executive Director of the Western States Water Council in July 2009. The Council is affiliated with the Western Governors' Association. Its members are appointed by the governors of 18 states. Formerly the Deputy Director, he has been with the Council since 1979. He holds a BA in political science from Brigham Young University, and a MS in public administration from the University of Utah; and is a member of the National Honor Society for Public Affairs and Administration (Pi Alpha Alpha). He oversees publication of a weekly newsletter, *Western States Water*, which he edited for many years. He is the author of numerous articles and reports covering a wide range of water resource issues, including water project financing and cost sharing, ground water management and recharge, water conservation, drought, and interregional water transfers. He is also one of the principal author's of the WGA's 2006 Report, *Water Needs and Strategies for a Sustainable Future* and 2008 *Next Steps* Report, as well as a WSWC's 2010 *Progress* Report.

*Coordination with Federal, Tribal, State, and Local Governments***Tom Littlepage, Alabama Office of Water Resources**

Mr. Littlepage graduated from Auburn University with a degree in Civil Engineering. He spent approximately nine years in the Air Force serving in Florida, Hawaii and, finally, as the Director of Civil Engineering for the 28th Air Division at Tinker AFB in Oklahoma City, Oklahoma.

In 1992, he returned to Alabama where he began his career with the State of Alabama with the Alabama Department of Environmental Management (ADEM). In 1994, he transferred to the Office of Water Resources (OWR), a division of the Alabama Department of Economic and Community Affairs (ADECA).

While in OWR, his initial focus was in support of the ACT/ACF Comprehensive Study. This involved both technical analysis and program support in determining Alabama's requirements as well as overall policy direction in the oversight of various aspects of the Water Wars. He also helped to support the development and negotiations associated with two interstate compacts; the Alabama – Coosa – Tallapoosa (ACT) River Basin Compact and the Apalachicola – Chattahoochee – Flint (ACF) River Basin Compact.

Currently, Mr. Littlepage heads the Water Management Branch of the Alabama Office of Water Resources and manages the Water Use Reporting Program for the State of Alabama. He also oversees Alabama's drought planning and management process and several water studies that are the start of efforts to better understand the water resources of our state. He has also been working to begin fuller implementation of the Alabama Water Resources Act and to develop broader policy guidelines and a management framework to accomplish all the actions required under the Act.

Nolan Doesken, Colorado Climate Center

Nolan Doesken is the State Climatologist for Colorado at the Colorado Climate Center at Colorado State University (Fort Collins). Nolan has been actively involved in drought monitoring, research and drought communications since he first started work at the Colorado Climate Center during the western U.S. drought of 1977.

Butch Blazer, Deputy Under Secretary for Natural Resources & Environment, USDA

Arthur "Butch" Blazer serves as USDA Deputy Under Secretary for Natural Resources and Environment. In 2003, Governor Bill Richardson appointed Butch as "State Forester" of New Mexico, the first Native American to hold that position. During his tenure as State Forester, Butch was also named as Chair of the Council of Western State Foresters and Co-Chair for the Western Forestry Leadership Coalition. A member of the Mescalero Apache Tribe, Butch has been intimately involved in Tribal issues throughout his life.

Prior to his service as State Forester, he served 27 years in the department of Interior's Bureau of Indian Affairs as a Range Management Specialist, Natural Resources Manager, and Agency Superintendent. Blazer is the former owner of Blazer Conservation Connections, a natural resources based consulting company that specialized in connecting clients with the resources

needed to enhance and protect the environment. He was also a co-founder of the Native American Fish & Wildlife Society, and has served on their Board of Directors and as the organization's National President. In 1998 Butch was elected, and served two consecutive terms, to the Mescalero Apache Tribal Council. An avid outdoors man when he can get to it, Blazer enjoys hunting, skiing and just "hiding-out" in the vast wilderness of his beautiful Mescalero Apache Reservation.

Josh Barnes, Economic Development Administration; National Coordinator for the Economic Recovery Support Function (RSF) under the National Disaster Recovery Framework

Thursday, December 13

Keynote Speaker

The Honorable Sam Brownback, Kansas Governor

Born to Robert and Nancy Brownback, Sam grew up on the family farm near Parker, Kansas. His parents still live and work on the farm. Growing up, Sam learned the importance of hard work, responsibility and family. He watched his parents persevere during droughts and heavy rains. He worked alongside his family to bring in the crops and take care of the livestock.

Sam's passion for public service began when he attended Prairie View High School when he was elected state president of the Future Farmers of America and then later national FFA vice-president. His participation in FFA taught him about leadership.

After graduating from Prairie View in 1974, Sam attended Kansas State University in Manhattan where he served as KSU student body president his senior year. He also belonged to the Alpha Gamma Rho Fraternity. He received his degree in Agricultural Economics in 1978.

After working for a year hosting a radio show, Sam attended the University of Kansas Law School where he was his class' president before completing his law degree in 1982.

Sam met his wife Mary while they were both in law school. They have been married for 29 years. Sam calls Mary "the glue that holds our family together". They live in Topeka and have five children – Abby, Andy, Liz, Mark and Jenna. After their own adoption experience, the Brownbacks helped establish the Building Families Fund to assist Kansas families with adoption expenses.

After law school, Sam and Mary moved to Manhattan where Sam went to work for a local law firm and Mary commuted to Lawrence to finish her law degree. While in Manhattan, Sam also taught agricultural law at Kansas State University and co-authored two books on the subject.

In 1986 two events took place for Sam and Mary. Their first child, Abby, was born and Sam became Secretary of the Kansas Board of Agriculture, the youngest in state history. The farming industry was struggling in the late 80s. Sam worked to renew the rural heartland by actively engaging in re-opening U.S. beef trade in Asia; expanding market opportunities for agriculture products; and promoting new uses of farm commodities.

During his time as Ag Secretary, Sam served as a White House Fellow in the first Bush Administration. In 1994 Sam was elected to congress in the Republican Revolution that brought the first Republican-controlled House of Representatives to Washington since Dwight D. Eisenhower was President. Sam was selected by his classmates to be the head of the New Federalist, a group focused on producing a smaller federal government and a balanced budget.

Two years later Kansans elected Sam to the U.S. Senate seat once held by Bob Dole. In the Senate, Sam was an effective advocate for Kansas interests. He served as the top-ranking Republican on the Agriculture Appropriations Subcommittee, which oversees U.S. Department of Agriculture programs as well as food safety and agencies responsible for protection of public health such as the Food and Drug Administration. And as a member of the Homeland Security Subcommittee, Sam's top priority was to insure full support for the National Bio-Agri Defense facility in Kansas. As part of the team that won this competition for Kansas, Sam worked hard to see that Kansas reaped the full benefits of this exciting development. Sam also pushed for meaningful tax reform and an optional flat tax, a BRAC-like commission to review and terminate failed or completed federal programs, and to build market and consumer based solutions to health care reform. He was a founding member of the Senate Fiscal Watch Team and strongly supports a balanced budget and reform of the earmark and appropriations process. He believed deeply then as he does now that we must defend traditional marriage, confirm judges who will interpret the law and not legislate from the bench, protect and renew our American culture and defend innocent human life at every stage of development.

He pledged he would serve only two elected terms in the U.S. Senate and in 2010 honored his pledge and did not seek reelection in 2010.

*U.S. Drought Readiness – Improving Resilience (Panel 2)***John Tubbs, Deputy Assistant Secretary for Water and Science, Department of the Interior**

Tubbs has more than two decades of experience working on Montana's water issues, largely for the state's Department of Natural Resources and Conservation. He presently oversees the state's water resources and has put in place programs such as water right processing, water management, operation of state-owned water projects, floodplain management and dam safety regulations. His vast experience in water resource issues will help him advise and consult the assistant secretary for water and science.

Tubbs headed Montana DNRC's Water Resources Division, a position he started in November 2006. Before acquiring his current position with the department, Tubbs served for six years as chief to the Resource Development Bureau, and prior to that he worked as an economist in the Energy and Water Resources division.

Tubbs earned a bachelor's degree in forestry in 1983 and a master's degree in economics in 1991, both from the University of Montana. He was born in Helena, Mont., and is married to Stephanie Ambrose Tubbs. They have two sons, both attending the University of Montana.

Michael Scuse, USDA Under Secretary for Farm and Foreign Agriculture Services

Prior to this position, Scuse served as Deputy Under Secretary for the FFAS mission area from 2009 to 2011 with primary responsibility over our domestic programs (Farm Services Agency and Risk Management Agency). Before joining USDA, Scuse was Secretary of Agriculture for Delaware from May 2001 until September 2008, when Governor Ruth Ann Minner (D) named him as her chief of staff. From 1996 to 2001, Scuse served as both chairman of the Kent County (Delaware) Regional Planning Commission and chairman of USDA's FSA State Committee. Before that, he was Kent County Recorder of Deeds. In addition to serving as NASDA vice president while agriculture secretary, Scuse was also president of the Northeast Association of State Departments of Agriculture. He lives in Smyrna, Delaware, with his wife Patrice.

Ann Mills, USDA Deputy Under Secretary for Natural Resources and the Environment

Ann Mills was named USDA Deputy Under Secretary for Natural Resources and Environment on July 6, 2009. In this position, Mills has responsibility for the Natural Resources Conservation Service (NRCS), the federal agency with primary responsibility for working with private landowners in conserving, maintaining and improving their natural resources.

Mills brings to USDA a diverse set of skills and experience from both the government and non-profit sectors. Most recently, as a senior executive at American Rivers, Mills directed day-to-day operations, led the expansion of regional offices and directed a team of senior policy staff. Mills also has extensive experience working on Capitol Hill, having directed the Senate office of Senate Democratic Leader Tom Daschle and worked on bio-fuels issues for then-Congressman Richard Durbin.

Mills holds a Masters Degree from the Lyndon B. Johnson School of Public Affairs at The University of Texas at Austin, and a BA in Political Science from Tufts University. She currently resides in Silver Spring, MD.

James C. Dalton, Chief of the Engineering and Construction, U.S. Army Corps of Engineers

Mr. James C. Dalton currently serves as Chief of the Engineering and Construction (E&C) and is responsible for policy, program, and technical expertise in the execution of over \$10 billion of design and construction programs for the U.S. Army, U.S. Air Force, Department of Defense, other Federal agencies, and over sixty foreign nations. He provides leadership to a field organization consisting of 8 divisions, 41 districts, and approximately 15,000 personnel and guides the development of engineering and construction policy for the Corps world wide Civil Works, Military, and Environmental Missions. He also serves as the Corps South Atlantic Division Regional Integration Team (RIT) leader.

Mr. Dalton served as the Regional Business Director for the South Atlantic Division in Atlanta, Georgia from July 2005 to May 2007. He led strategic initiatives, performed strategic evaluations of long-term workload trends, promoted and managed workload sharing between the districts and other Corps of Engineers business centers. He also led the Programs and Project Management Business Process throughout the South Atlantic Division by ensuring standard business processes and policies in all programs. He was responsible for providing regional support in Contracting, Engineering, Construction, Information Management, Resource Management, and Public Affairs.

Mr. Dalton served as Director of Business Management for Gulf Region Division in Baghdad, Iraq from 13 January 2005 to 31 July 2005. He led the Programs and Project Management Business Process to ensure standard business processes and policies

to support all Districts in programs, real estate, engineering, construction, contracting, and resource management functions. He provided executive leadership and direct supervision of the project management and technical functions in executing the GRD construction program. Mr. Dalton managed the Regional Operating Budget and provided executive leadership in executing the financial management program.

Mr. Dalton served as the Deputy District Engineer for Programs and Project Management Division of the Alaska District located in Anchorage, Alaska until January 2005. He was responsible for the execution of the District's Military, Civil Works, Environmental Interagency and International Support programs and projects for Army, Air Force, DoD, Federal, State and local agencies in Alaska. He provided management, direction, control and oversight of planning, engineering and construction programs and projects with an average annual construction value in excess of \$500 million.

From 1999 to 2001, he served as the Deputy District Engineer for Programs and Project Management Division; Chief, Ministry of National Defense/Host Nation Liaison of the Far East District in Seoul, Korea, where he provided leadership and oversight of a large military construction program. Mr. Dalton spent several years working in the Middle East where he began as Office Engineer for the Utilities Resident Office in 1981 as part of the Saudi Arabia construction program executed by the Corps. During his assignments in Saudi, he also served as project engineer and resident engineer in various other offices. Mr. Dalton was the project manager for the Bosnia project to support Operation Joint Guard and other projects for the Transatlantic Program Center. From 1997 to 1999, he was the Chief and senior in-country representative for the Corps' office in Egypt. He served in this capacity for two years before accepting an assignment in Korea.

Mr. Dalton is a native of North Carolina and has been employed by the U.S. Army Corps of Engineers since 1978. After a short employment with the Environmental Protection Agency in Atlanta Georgia, Mr. Dalton joined the Corps' Wilmington District in Wilmington, North Carolina. He began his career with the Corps as a cost engineer in Wilmington after completion of the training program.

Mr. Dalton earned his B.S. degree in Architectural Engineering in 1978 from N.C. A&T State University in Greensboro, N.C. He was selected for Long Term Training and attended N.C. State University where he earned his Masters Degree in Civil Engineering in 1992. Mr. Dalton is a registered professional engineer in Virginia. Mr. Dalton was awarded the Excellence in Construction Management Award in 1995 and was the winner of the nationally recognized Black Engineer of the Year in 2007 for Career Achievement. Mr. Dalton also has received numerous performance awards including the Superior Civilian Service award in 2001 for his work in the Far East District and the Meritorious Civilian Service Award for work in Iraq in 2005.

Jay Jensen, Associate Director for Land and Water Ecosystems, White House Council on Environmental Quality (CEQ)

Prior to moving to CEQ, Jay was Deputy Undersecretary for Natural Resources and the Environment at USDA. Before his appointment, Jensen worked on the Western Governors' Association's biomass energy program. He also served executive director of the Council of Western State Foresters/Western Forestry Leadership Coalition, a partnership between the state and federal governments. He served as a lead forestry adviser for the House Agriculture Committee during the 2002 farm bill.

Jensen, a southern California native, holds a bachelor's degree from the University of California at Los Angeles and a master's in forestry from Colorado State University. Jensen is married with a daughter and son.

USDA Efforts on Drought Preparedness and Response

Keynote Speaker

The Honorable Tom Vilsack, Secretary, U.S. Department of Agriculture

Dr. Kathryn Sullivan, Assistant Secretary of Commerce for Environmental Observation and Prediction and Deputy Administrator for the National Oceanic and Atmospheric Administration (NOAA)

On May 2, 2011, Dr. Sullivan was appointed by President Obama as assistant secretary of commerce for environmental observation and prediction and deputy administrator for the National Oceanic and Atmospheric Administration (NOAA). She is also performing the duties of NOAA's chief scientist. She is a distinguished scientist, renowned astronaut and intrepid explorer.

As assistant secretary, Dr. Sullivan plays a central role in directing Administration and NOAA priority work in the areas of weather and water services, climate science and services, integrated mapping services and Earth-observing capabilities. She provides agency-wide direction with regard to satellites, space weather, water, and ocean observations and forecasts to best serve American communities and businesses. As Deputy Administrator, she oversees the smooth operation of the agency. Dr. Sullivan's impressive expertise spans the frontiers of space and sea. An accomplished oceanographer, she was appointed

NOAA's chief scientist in 1993, where she oversaw a research and technology portfolio that included fisheries biology, climate change, satellite instrumentation and marine biodiversity.

Dr. Sullivan was the inaugural director of the Battelle Center for Mathematics and Science Education Policy in the John Glenn School of Public Affairs at Ohio State University. Prior to joining Ohio State, she served a decade as President and CEO of the Center of Science and Industry (COSI) in Columbus, Ohio, one of the nation's leading science museums. Dr. Sullivan joined COSI after three years' service as Chief Scientist.

Dr. Sullivan was one of the first six women selected to join the NASA astronaut corps in 1978 and holds the distinction of being the first American woman to walk in space. She flew on three shuttle missions during her 15-year tenure, including the mission that deployed the Hubble Space Telescope. Dr. Sullivan has also served on the National Science Board (2004-2010) and as an oceanographer in the U.S. Navy Reserve (1988-2006).

Dr. Sullivan holds a bachelor's degree in earth sciences from the University of California at Santa Cruz and a doctorate in geology from Dalhousie University in Canada.

Congressional Panel

Betsy A. Cody, U.S. Congressional Research Service

Cody is a specialist in natural resources policy with the U.S. Congressional Research Service (CRS), Library of Congress, where she specializes in western water policy. Issue areas include water transfers and markets, water reuse, watershed and river basin management, rural water supply, title transfer, water resources planning, and projects, policies, and programs of the Bureau of Reclamation. She also covers national water policy issues and water policy commissions. Cody has published numerous reports and analytic memos for Congress. She also has testified before the U.S. House of Representatives Natural Resources Committee and the U.S. Senate Energy and Natural Resources Committee. She also has briefed the National Academy of Sciences, National Research Council Water Science and Technology Board, most recently on water reuse. Cody is a two-time past president of the local chapter of the American Water Resources Association (AWRA), past finance chair for the national AWRA, and former editorial board member of Choices magazine. She holds a B.S. in Urban Design/Land Use Planning from Lewis & Clark College, Portland, OR, and a Masters in Public Administration from the Evans School of Public Affairs, University of Washington, Seattle, WA.

Sara Tucker, Senate Energy and Natural Resources

Sara Tucker is a Senior Professional Staff Member on the Senate Energy and Natural Resources Committee. She works on public lands and water issues and now staffs the Water and Power Subcommittee under the leadership of Senator Shaheen. Prior to joining the Committee, Sara worked as the Director of Government Affairs at Trout Unlimited. She received her master's in environmental policy from the University of Michigan and a bachelors of science degree from Cornell University.

Tina May, Senate Agriculture

Tina May serves as Senior Professional Staff on the Senate Committee on Agriculture, Nutrition and Forestry, handling the conservation, environment, forestry and international agriculture portfolios. Most recently, she served as the Legislative Director for the Office of Congressional Relations at USDA. Prior to her time with USDA, May worked on the Senate Agriculture Committee under Chairman Harkin focusing on conservation and energy issues including the 2008 Farm Bill. May has previously worked for the Sustainable Agriculture Coalition and The Scouler Company. May hails from a family farm in Stacyville, Iowa and earned her B.A. from the University of Minnesota and her M.S. from the City University of London.

Tara Rothschild, House Science, Space and Technology

Jon Pawlow, House Transportation and Infrastructure

Jon Pawlow is Majority Counsel for the Water Resources and Environment Subcommittee of the House Committee on Transportation and Infrastructure. He is responsible for matters within the Subcommittee's jurisdiction relating to water pollution control and water infrastructure; wetlands; watersheds; hazardous waste cleanup; and water resources management, conservation, and development.

Jon is an attorney and scientist/engineer with expertise in the environmental and intellectual property fields. He has over 15 years of private law practice experience, and substantial public sector legislative, regulatory, law, policy, and technical

experience, originally with the U.S. Environmental Protection Agency, more recently as Assistant Chief Counsel with the Office of Advocacy of the U.S. Small Business Administration, and now with the House Transportation and Infrastructure Committee.

Jon earned his law degree from the Georgetown University Law Center, and MS and BS degrees in water resources engineering and environmental science, both from Rutgers University. Jon is a member of the District of Columbia and Virginia Bars, and is also registered as a patent attorney to practice before the U.S. Patent and Trademark Office.

Appendix 4

Breakout Session Notes

Day 1

The discussion and recommendations that came out of the breakout sessions on Day 1 are summarized in the following table:

Breakout Group	Responses to Question #1 – “Key Drought Data & Information”
Agriculture	<ul style="list-style-type: none"> • U.S. Drought Monitor heavily used and NOAA ENSO and streamflow forecasts heavily relied upon and needed. • NEED Insurance for Livestock/Fruits + Vegetables and Specialty Crops as well. • NEED Comprehensive and integrated Government Drought Program Directory/Reference
Wildfire	<ul style="list-style-type: none"> • Drought Monitor • Palmer Drought Index • Keetch Byram Drought Index (in south) • Climate Prediction Center Models • Local weather station data • State Hazard Mitigation Plans • NCDC Website • Local / County Mitigation plans • Daily Vegetative greenness / departure from normal • Snowpack indices • Presence of La Niña / El Niño • Some disconnect between wildfire science (fuel moisture index) & data and climate / meteorological resources. • Identify better EM triggers. • Wildfire program data should be broadcast more widely, i.e., beyond wildfire community.
Tourism/Natural Res.	<ul style="list-style-type: none"> • Threatened and endangered species • Landscape and Habitat • On reservoir recreation • In stream recreation • Camping and hiking • Navigation/transportation • Medicinal Plants • Native Plants for weaving and baskets • Sustenance hunting and fishing <ul style="list-style-type: none"> - elk and antelope population health • Snow sports industry (~\$12B, 200,000 jobs) <ul style="list-style-type: none"> » consumer confidence » apparel and equipment inventories » participation and visitations • Fisheries – anadromous and freshwaters • Seasonal forecasts <ul style="list-style-type: none"> » persistence versus end or termination of drought • How to operate if the drought continues? <ul style="list-style-type: none"> » water conservation » drilling wells » building dams » education • Biweekly webinars – awareness expand to other areas – greater coverage nationally. • Connect on the ground needs to national capabilities.
Energy	<ul style="list-style-type: none"> • Hydro • Fracking • Cooling • Biofuels

Energy cont.	<ul style="list-style-type: none"> • Renewable energy • Fossil fuel extraction – coal • Produced water – reclaiming • Reclaiming land • Energy marketing as function of climate outlooks
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Breakout Group	Responses to Question #2 – “Drought Preparedness”
Wildfire	<ul style="list-style-type: none"> • The group consensus was that the wildfire community (decision makers and researchers) were well prepared / had sufficient information to offer warning. • Opportunities to improve preparedness <ul style="list-style-type: none"> » Communications need to improve to disseminate information to local emergency managers and the public » Need better public education and outreach » Wildfire management and tourism “are in conflict”. • Identify specific actions/programs that would have improved preparedness. <ul style="list-style-type: none"> » Utilize new modes of communication like Facebook and/or iPhone App

Breakout Group	Responses to Question #3 – “2012 Drought Response & Impacts”
Wildfire	<ul style="list-style-type: none"> • Better coordination was needed between wildfire management data and other weather data (for example, NOAA Red Flag warnings differed from Forest Service and local warnings). • Prospects for enhanced response? <ul style="list-style-type: none"> » Good – need to improve transmission of weather / wildfire information and warnings to public and state / local / tribal governments. • Consider a more coordinated federal response? <ul style="list-style-type: none"> » Yes, but with deference to the unique needs of local decision-makers.

Breakout Group	Responses to Question #4 – “Key Partnerships”
Agriculture	<ul style="list-style-type: none"> • Establish more formal partnerships between rural and urban areas. • Need for better understanding of physical and mental health service issues. • Explore need for more formal regional/basin coordination between states/basins.
Wildfire	<ul style="list-style-type: none"> • Need public outreach and education in fire science (K-12 programs have proven successful in the past). • More use of social media. • Use personal connections. • Strengthening Partnerships? <ul style="list-style-type: none"> » Develop “National Wildfire Cohesive Strategy” at county and state level with the following goals: <ul style="list-style-type: none"> • Build resilient communities » Restore the landscape (post fire) <ul style="list-style-type: none"> • Risk management » Reach out to water utilities (post fire restoration) • BAER (Burned Area Emergency Response) teams are very valuable (erosion: new flood flows, debris implications)
Tourism/Natural Res.	<ul style="list-style-type: none"> • USACE partnerships in place • seasonal climate forecast skill not sufficient or interpretation different between science expert and public. • Having science agencies effectively communicate the information in their forecast to both the resource management agencies and the non-expert public. • Creating water infrastructure – small cities, towns, rural water districts, and tribes need help in terms of capacity building, expertise and funding. • Establish inventory of application experiences to guide and build on past information applications and experiences to address similar issues. • Cultivate relationships and educate local media so drought information is reported on accurately, proactive engagement monthly, every two months to have the information flow from science agencies. • Communities of practice derive different information from the same forecasts. Social media targeted information for key audiences. • TVA has app for reservoirs and flows. • Identify different meanings of end of drought, drought recovery, timescales of droughts, definition.

Breakout Group	Responses to Question #5 – “Key Recommendations for Improving Drought Preparedness”
Agriculture	<ul style="list-style-type: none"> • Planning and Coordination still lacking: <ul style="list-style-type: none"> » No planning/coordination on interbasin/interstate transportation » MO/MISSISSIPPI basin example • Communication: dissemination via the right channels and to the right places: <ul style="list-style-type: none"> » Social Media » Irrigation districts, Farm Bureaus, seed dealers, family, producer blogs, etc. • Need for more Virtual Drought Scenario Exercises at various levels • Need more timely and coordinated crop insurance flexibility/decisions <ul style="list-style-type: none"> » coordination between USDA/DOI on CRP or BLM grazing » Need to coordinate state and federal actions within states. State drought plans are effective in coordinating response and preparedness. » Need to coordinate federal actions and programs for maximum benefit. Revisit the National Drought Policy Commission report (2000) and review the recommendations for a risk-based national drought policy framework. » Expand the information clearinghouse (e.g., NIDIS) to provide greater diversity of information to user community.
Wildfire	<ul style="list-style-type: none"> • Competition for water resources to use for wildfire management actions. • Access to water (property rights issues). • Cost-sharing / resources for pre-positioning of fire equipment (FEMA). • Use of out-dated models for future scenarios (“climate change is creating new normal”). <ul style="list-style-type: none"> » Actionable next steps? » Get communities engaged to make themselves more wildfire resilient. » Investigate using data clearinghouse or NIDIS portal for information dissemination. » Include public health implications in data (air quality, etc.). » Cross-overs between wildfire management and NIDIS. » Better sharing of information between drought managers and wildfire management.
M&I Water	<ul style="list-style-type: none"> • There needs to be a realization that not all water needs can be met during a drought. As such, need to prioritize water demand/supply/usage (watering lawns versus hospital needs) and bring the community into those discussions. Public health needs would be incorporated into that, as well as prioritize who/what processes need potable water versus sub-potable water (such as recycled water). • Triggers should be in place for mitigation and other demand-responses (including prioritizing) and secondary and tertiary effects should be considered as well. • Drought planning should incorporate and identify sectors of the population at risk that need additional assistance and track those vulnerable populations. This was lacking when trying to respond to super storm sandy that there was no way of knowing where those populations were to provide with the additional support necessary during the recovery efforts. • Reevaluate how water is priced, incorporating actual value into the price that consumers pay (in lieu of the otherwise low price it is available at now). Lessons and processes of the electricity sector in decoupling prices/usage, as well as rate setting similar to the “smart grid”. • New prices would meet the actual supply/demand/peak of water. • Current revenues received from water sales would also need to be addressed, as they could be a disincentive for effective water management during a drought. • Increase efficiency of water infrastructure, particularly in the interconnection between systems. Identifying those regulations that are barriers to the interconnections should be identified, with possible model legislation available to allow for increased interconnection. Increased efficiency could also be attained by utilizing “low hanging fruit”, such as water loss of aging systems. • Likely for all groups, there was a general idea that we need to look at short and long-term mitigation and to keep the focus even when the threat dissipates. Micro storage also something of interest.
Tourism/Natural Res.	<ul style="list-style-type: none"> • There are numerous water customers and stakeholders who have appreciated Reclamation’s efforts under the Reclamation States Emergency Drought Relief Act of 1991. Many of these entities favor seeing our authorities reestablished. • Develop talking points to convey to BOR stakeholders about the action outcomes showing that we’re working with partner organizations on dealing with 2012 drought aftermath and preparing for 2013 drought possibilities. • Consider resources that are committed to federal seasonal climate and drought prediction. This consideration should include resources directed to prediction research/improvements, which would ultimately benefit Reclamation water management. • Improve the connection of on-the-ground-needs to national capabilities • Identify communities, states, and natural resources that are most vulnerable and connect proactively to drought information experts. • Use climate change vulnerability assessments to identify drought sensitivities.

Tourism/Natural Res. cont.	<ul style="list-style-type: none"> • Drought preparedness through water supply infrastructure investments. • Recognize there are international issues in basins shared with Mexico and Canada. • Raise the profile of groundwater with respect to future drought monitoring and long-term response assessments (e.g., don't just focus on surface/stream waters)....enhance the groundwater climate response network to a national real-time network, assess and identify groundwater systems that are sensitive to drought, and use ground/surface water flow modeling to enhance knowledge and understanding of how large scale drought impacts US water resources. • Pay more attention to the issue of reservoir capacity, particularly as it is affected by sedimentation..... we are on the cusp of new technology for measuring sediment and QW with sediment surrogates that would enable better monitoring of sediment and perhaps longer enable us to squeeze longer service reservoirs. • Pursue an initiative to analyze near-real-time assessment of water use during drought periods that provides a regional and national picture of how water use is changing during the drought. It may be possible to get one or two states perspective on this, but when 30 states are encompassed by drought, a regional or national picture is needed. There needs to be a system put in place that allows the USGS to interact effectively with states' water use data systems to obtain a near-real-time picture of water use during the drought. <ul style="list-style-type: none"> » This requires quite a bit of work on database interoperability, common data elements on water use between states, and other water availability supporting information. The USGS has been working with the Western States Water Council, who are pioneers in the area of water use information and working with multiple states, on a new system they have initiated called WaDE (Water Data Exchange). Under leadership by the Western States Water Council, this would bring water use data from 17 states together in a common portal and with common data elements, allowing evaluation of this data across state lines. This type of system is needed nationally and on a near-real-time basis. • Increase investment in existing water monitoring systems: monitoring of streams, groundwater, atmospheric factors (like evapotranspiration), water quality, and water-dependent ecological resources, need to be expanded. More streamgages are constantly needed, along with more groundwater monitoring, water quality, and biological monitoring. During a drought, the lack of this information becomes more critical because the need to it is amplified. • Biological resources need to be considered during times of drought, as well as at all other times. • Develop a better understanding of how agricultural practices during drought may impact sensitive species and their habitats, and what modified agricultural practices may be used to effectively respond to drought and avoid or mitigate adverse impacts to sensitive species and their habitats. Investigate possible changes in Conservation Reserve Program (CRP) practices, and other agricultural programs to accomplish this. • Increase investment in existing water monitoring systems: monitoring of streams, groundwater, atmospheric factors (like evapotranspiration), water quality, and water-dependent ecological resources, need to be expanded. More streamgages are constantly needed, along with more groundwater monitoring, water quality, and biological monitoring. During a drought, the lack of this information becomes more critical because the need to it is amplified. • Biological resources need to be considered during times of drought, as well as at all other times. • Develop a better understanding of how agricultural practices during drought may impact sensitive species and their habitats, and what modified agricultural practices may be used to effectively respond to drought and avoid or mitigate adverse impacts to sensitive species and their habitats. Investigate possible changes in Conservation Reserve Program (CRP) practices, and other agricultural programs to accomplish this. • Funding flexibility to anticipate changes in risk. • NOAA's RISAs are great regional assets. • TVA use of forecast data to plan and allocate resources. • Short term information to manage transition from flood control to water supply. • Temporal and spatial variations in skill and reliability of forecasts. • How to make information more accessible – by NOAA, Ag extension? • Work to better communicate temporal and spatial variations in skill, confidence and reliability of forecasts • Cultivate relationships and educate local media so drought information is reported on accurately, proactive engagement monthly or every two months to have the information flow from science agencies • Since communities of practice derive different information from the same forecasts, use social media targeted information for key audiences. • Improve the connection of on-the-ground-needs to national capabilities • Identify communities, states, and natural resources that are most vulnerable and connect proactively to drought information experts. • Use climate change vulnerability assessments to identify drought sensitivities. • Drought preparedness through water supply infrastructure investments. • Recognize there are international issues in basins shared with Mexico and Canada.
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Day 2

The Forum ended with a collective brainstorming by all Forum participants to further consider and refine recommendations for improving drought preparedness. Recommendations that were offered during this session included:

Regarding "Awareness and Networks"

- Engage Press to drive a message. The message must be positive (not doom and gloom)
- Engage Social Media
 - » The question is "who will do the engaging"?
 - » Need to develop a social media strategy
 - » Focus on the top 5 things/issues: to states, public, private sector
- There needs to be a consistent message
 - » State drought plans can be a tool for coordinating consistent message.
 - » Governors' associations could be a partner to that end
 - » Involve the state hazards mitigation person.
- Need to communicate drought information in real-time, i.e., 'where we are now with drought conditions'
- Need to take advantage of existing communications for
 - » Established communications in disaster response programs, e.g., DHS; and NICKEL call.
- *Broadcast meteorologists are well regarded and trusted – they could be a good messenger*
 - » Am Meteorological Society could be a good partner
- Need to have a proactive preparedness & mitigation message, along the lines of "don't move your firewood because of spread of invasive."
- Need to identify and coordinate on the key messages coming from this National Drought Forum!
 - » Include the key recommendations
 - » Build a network/coalition/partnerships to work on implementation
- Hold a Late Winter "Early Drought Warning" event to get the word out on key messages from Forum.

Drought Monitor

- Drought Monitor is a great tool. It is time to start showing drought impacts.
- When media call the NDMC, 1st question is: How bad is the drought? The 2nd question is: What do we do about it? We need to have good responses to both questions!

Planning/Preparedness

- We should attempt to influence the National Planning System (and its 5 frameworks)
- Engage FERC on water-energy nexus
- The Water Sense Program at EPA is a potential partner for engaging M&I
- Include a focus on water security, and conduct table top exercises for major water utilities
- We need to address the current disconnect with crop insurance – i.e., that farmers continue to irrigate their crops, even when they are dead, in order to collect insurance.
 - » RMA needs to get the word out on “Preventative Planning”
- Short-term v. Long-term Mitigation actions – The message needs to be on long-term, but current authorities generally are limited to short-term actions.
- We need to collect and make available information on impacts from drought conditions.
- It was recommended that we work in partnership with WGA to pursue implementation of the recommendations in their 2011 report to improve drought preparedness, particularly regarding the recommendation for a process to develop specific strategies regarding drought preparedness planning and for improving (longer-term) coordinated drought policies.
- Drought planning is only one aspect to water resources planning. We need to look at all related resources planning *opportunities*.
- We need real-time data on water use; monitoring certain water use categories to be able to characterize water demand.
- Need to have a weekly estimate of how much precipitation it would require to end the drought
- Federal – State partnerships
 - » Corps’ “Silver Jackets” is a model for federal agency coordination requested by states.
 - » WEST Fast is a good model in the West. It should be considered for other regions of the country and for specific watersheds.
- Identify regions/areas that are vulnerable and make them pilots/models
- Have states undergo “stress tests” when they are in a drought of record.

Congressional Authorizations

- NIDIS needs to be reauthorized – we need to get the message out on the importance of NIDIS!
- Sandy disaster funding vs. ’12 drought disaster funding – although costs related to the drought will exceed costs from Hurricane Sandy, Sandy approps likely to happen more quickly. Why is it consistently easier for other natural disasters to get funding relevant to drought disasters? This needs to be addressed.
- Build a coalition coming out of the National Drought Forum to work on implementation of the key recommendations that came out of the Forum
- Broaden Stafford Act to include drought
- Farm Bill – fast track key sections relevant to drought, e.g.
 - » livestock assistance;
 - » USDA/DoI releasing CRP lands to consider wildlife values
- Reclamation States Drought Relief Act needs to be reauthorized
- Need to seek federal funding to the Corps and BoR to do drought preparedness planning (under their respective existing authorities to provide planning assistance)
- Funding for Water Projects to allow utilities to diversify their water sources – this will create longer-term resiliency to

their systems.

- » Need to seek increased funding for State Revolving Funds under CWA and SDWA. Current SRF funding is in decline.
- » 'Water Infrastructure Financing and Innovation Act' is another place to seek federal funding for big water development projects.

WGA & WSWC Priorities as Presented by Tom Iseman and Tony Willardson

Immediate Asks:

1. Establish regular, real-time coordination and information sharing on the status, impacts, and prospects for drought throughout 2013 with the Western states.
2. Work with states and local water users to identify priority basins or projects in the Western US that will be (or have been) severely affected by drought, in order to focus mitigation strategies for 2013.
3. Coordinate USDA and other federal disaster declarations and drought relief programs, targeting critical basins or regions and working directly with state resource managers.

Mid-Range to Long-term Goals:

1. Improve weather and climate forecasting at seasonal time scales, so we can better anticipate and prepare for drought.
2. Reauthorize National Integrated Drought Information Service and Reclamation States Emergency Drought Relief Act.
3. Develop a Regional Early Warning System for the Upper Missouri.
4. Establish a multi-stakeholder process to develop comprehensive, integrated drought preparedness policy and planning.
5. Maintain and enhance basic data collection and develop better information on the socio-economic impacts of drought.

NOTE: Key recommendations contained in the 2011 WGA report, "Improving Drought Preparedness in the West" (that were raised and discussed during this final session):

- » Encourage and assist partners to support full funding of the collection of basic data relating to drought, especially for USGS streamgaging and NRCS snowpack monitoring.
- » Work with the NIDIS program to extend regional drought early warning information systems to priority areas, with the continued goal of eventually building a nation-wide drought information system.
- » Work with the Administration and Congress to extend the authorization of the NIDIS program and to promote full funding of the NIDIS, particularly with respect to establishing priority regional drought early warning information systems. WGA will work with Congress to include NIDIS authorization for other agencies with drought-related expertise or responsibilities.
- » Pursue a process with states, key federal agencies, local and tribal government representatives and stakeholder groups to present a vision and road map for drought planning. The process could be similar to the processes managed by WGA that resulted in the WGA reports "Future Management of Drought in the West" and "Creating a Drought Early Warning System for the 21st Century."

Appendix 5

MOU Between DOC and USDA



**MEMORANDUM OF UNDERSTANDING
BETWEEN THE
U.S. Department of Commerce
AND THE
U.S. Department of Agriculture**

I. General Information

WHEREAS, the U.S. Department of Commerce (Commerce) has responsibility for supporting and sustaining economic growth and development, and, through the National Oceanic and Atmospheric Administration (NOAA), has responsibility for understanding, monitoring, and predicting weather and climate, including variations and changes in climate extremes, oceans, and coasts, and for sharing knowledge and information of interest to agriculture, forestry, and rural and urban communities to enhance the resilience of economies and ecosystems, across the Nation;

WHEREAS, the U.S. Department of Agriculture (Agriculture) has responsibility within the Federal Government to monitor and assess national and international food supplies and natural resource conditions, and acquires, analyzes and interprets weather and climate information for the purpose of providing appropriate information related to the impacts of weather and climate on ecosystems, rural communities, forestry, and agricultural production to the people of the United States; and

WHEREAS, there is increasing risk and vulnerability to rural and urban communities, tribal lands, the agricultural and forestry sectors, transport, and utilities from extreme weather events such as drought, flood, fire, tropical cyclones, and periods of high temperature, and there is evidence that these risks are changing due to climate change;

NOW, THEREFORE, Commerce and Agriculture enter into this Memorandum of Understanding (MOU) covering cooperative efforts to advance the development, sharing and application of weather, climate, economic and demographic information for risk management with respect to agriculture, forestry, and other resource management decisions, with an emphasis on food and energy security, international trade, water availability, water management and ecosystem protection in the face of changing environmental, economic, and social conditions.

II. Reference and Authorities

Commerce enters into this MOU pursuant to the authority vested in it by 15 U.S.C 313; Agriculture enters into this MOU pursuant to the authority vested in it by 7 U.S.C. 2201. This MOU supersedes the 1995 agreement between the two Departments relating to coordination and cooperation in climate and weather matters.

III. Purpose

The purpose of this MOU is to provide a framework for Agriculture and Commerce/NOAA cooperative efforts to meet the weather and climate information needs of the Department of Agriculture, Tribes, the agricultural and forestry sectors, rural and urban communities, and other stakeholders that rely on this information to make business and natural resource management decisions. The agreement will (1) strengthen Commerce's and Agriculture's development and delivery of relevant local and regional climate information services to agricultural, forestry, rural economies, and related sectors; and (2) foster improved understanding by end-users in these sectors of the value and use of weather and climatological information and its integration with social and economic information in planning and operational activities.

As appropriate, subsidiary agreements will provide details on specific collaborative activities. When such agreements are developed, they will become addenda to this MOU. These subsidiary agreements will cover various activities, including, without limitation:

1. Improved forecast reliability and projection of weather and climate extremes (e.g., onset, duration, severity), including studies, applications, and interpretations of agro-meteorological information needed in connection with droughts, flooding, tropical cyclones, storm surges, wildfire, insect pests and diseases, invasive species, and other spreading and intensifying environmental hazards.
2. Improved accessibility, compatibility, and sharing of data, analysis, and expertise by, for example, supporting the development of regional and international drought and disaster early-warning information systems; promoting interagency coordination across economic development and economic statistics offices and datasets; and developing timely, user-friendly communications tools and processes to inform preparedness, response, and adaptation, building on existing information networks in a multiple-hazards framework.
3. Improved drought and water resources data acquisition, monitoring networks, and databases, including the National Soil Moisture Monitoring Network, and continuing the successful collaboration between Commerce and Agriculture in the jointly published Weekly Weather and Crop Bulletin.
4. Enhanced adaptation strategies, and best practices and technologies for at-risk regions throughout the United States and other relevant areas affecting United States commodities and markets and natural resource management; improved integrated weather, climate, and economic research, tools, and models to enhance decisionmaking, risk management, and long-term sustainable development planning such as developing, testing, and evaluating weather and crop-yield models, and formulating integrated projections and scenarios to promote resilient ecosystems and communities in a changing environment.

IV. Responsibilities of the Departments

These responsibilities will be set out in subsidiary agreements.

V. Programming, Budgeting, Funding, and Reimbursement Arrangements

Within the terms of this MOU, budgeting, funding and reimbursements will be accomplished by the respective Departments in accordance with arrangement details established in subsidiary agreements and subject to the availability of appropriated funds for these purposes. The expenses of the cooperating Departments shall be limited to those necessary to perform the activities stated above.

VI. Publications

The results of these cooperative activities may be published jointly or by either of the Departments separately. Manuscripts resulting from these activities should be submitted to the other Department for suggestions and approval prior to publication.

VII. Publication Affairs and Press Liaison

Jointly produced data and information shall be released simultaneously by both Departments or with concurrence by the other when a release is by one Department.

VIII. Subsidiary Agreements

Additional working agreements between the Departments relating to the areas covered in paragraph III shall be effected in writing and signed by Department officials at levels of authority appropriate to the activity to be carried out under the subsidiary agreement. The signed subsidiary agreements then shall become addenda to this MOU. Subsidiary agreements will be jointly reviewed at least every 3 years by those parties entering into the subsidiary agreement.

IX. Third Party Liability

Each Department will be responsible for processing any claims arising out of the negligent or wrongful acts or missions of its employees.

X. Amendments and Review

This MOU may be amended in writing at any time by the mutual consent of the Departments concerned and shall be reviewed at an interval of not less than 3 years from the latest signature. Each Department agrees that prior to major changes in policy, budgets, or procedural practices affecting this MOU or subsidiary agreements, such information will be communicated to the other Department.

XI. Other Provisions

Nothing herein is intended to conflict with current Office of Management and Budget, Commerce, or Agriculture directives. If the terms of this MOU are inconsistent with existing or future directives or decisions of any of those three Departments, then those portions of this MOU which are determined to be inconsistent shall be invalid, but the remaining terms and conditions of this MOU not affected by an inconsistency shall remain in full force and effect. Should disagreement arise between Commerce or Agriculture representatives as to the interpretation of the provisions of this MOU or any amendment thereto, that cannot be resolved at the operating level, the area of disagreement should be clarified in writing by each party and presented to the other party for consideration at least 10 days prior to forwarding to an appropriate higher authority for resolution.

XII. Terms of MOU

1. The terms of this MOU will become effective upon signature of both approving officials of the respective Departments entering into this MOU. The terms of this MOU will remain in effect until termination by mutual agreement or by 30 days advance written notice of either party.
2. Agriculture and Commerce and their respective agencies and offices will handle their own activities and use their own resources, including the expenditure of their own funds, in pursuing these objectives. Each party will carry out its separate activities in a coordinated and mutually beneficial manner.
3. Nothing in this MOU shall obligate either Agriculture or Commerce to obligate or transfer any funds. Specific work projects or activities that involve the transfer of funds, services, or property among the various agencies and offices of Agriculture and Commerce will require execution of separate agreements and be contingent upon the availability of appropriated funds. Such activities must be independently authorized by appropriate statutory authority. This MOU does not provide such authority. Negotiation, execution, and administration of each such agreement must comply with all applicable statutes and regulations.
4. This MOU is not intended to, and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by a party against the United States, its agencies, its officers, or any person.

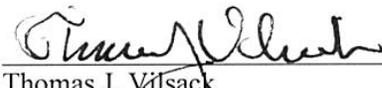
APPROVED:

U.S. DEPARTMENT OF COMMERCE

U.S. DEPARTMENT OF AGRICULTURE



Rebecca M. Blank
Acting Secretary of Commerce



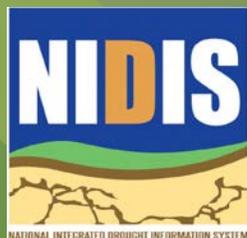
Thomas J. Vilsack
Secretary of Agriculture

12-21-12

Date

12.17.12

Date



National Drought Forum 2012

Drought and U.S. Preparedness in 2013 and Beyond
Summary Report and Priority Actions

Prepared by the National Integrated Drought Information System (NIDIS)