

MINUTES
of the
WATER RESOURCES COMMITTEE
Abbey Inn Hotel
St. George, Utah
September 29, 2016

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**MINUTES
of the
WATER RESOURCES COMMITTEE
Radisson Hotel
St. George, Utah
September 29, 2016**

MEMBERS AND ALTERNATES PRESENT

ALASKA	David W. Schade
ARIZONA	Einav Henenson
CALIFORNIA	Jeanine Jones Betty Olson Tom Howard
COLORADO	James Eklund Trisha Oeth
IDAHO	Jerry Rigby John Simpson
KANSAS	David Barfield
MONTANA	Tim Davis
NEBRASKA	Jeff Fassett
NEVADA	--
NEW MEXICO	--
NORTH DAKOTA	Garland Erbele Jennifer Verleger
OKLAHOMA	--
OREGON	--
SOUTH DAKOTA	--
TEXAS	Jon Niermann Jim Rizk

UTAH

Walt Baker
Eric Millis
Norm Johnson

WASHINGTON

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WYOMING

Pat Tyrrell
Steve Wolff

GUESTS

Jim Fredericks, U.S. Army Corps of Engineers, Portland, OR
John Moreno, U.S. Army Corps of Engineers, San Francisco, CA
Veva Deheza, National Oceanic and Atmospheric Administration, Boulder, CO
Randy Friedl, National Aeronautics and Space Administration/JPL, Pasadena, CA
Stephanie Granger, National Aeronautics and Space Administration/JPL, Pasadena, CA
Jordan Bunker, Southern Nevada Water Authority, Las Vegas, NV
Sue Lowry, Avocet Consult, Cheyenne, WY
Boyd Clayton, Utah Division of Water Rights, SLC, UT
Erica Gaddis, Utah Division of Water Quality, SLC, UT
Paul Blanchard, Northwest Pipe Company, SLC, UT
David Susong, U.S. Geological Survey – Utah, SLC, UT
Jeff DenBleyker, CH2M Hill, SLC, UT
Dave Gochis, National Center for Atmospheric Research, Boulder, CO
Vern Tharp, University Corporatino for Atmospheric Research, Boulder, CO
Marty Ralph, Scripps Institution of Oceanography, La Jolla, CA
Kent Jones, Utah Division of Water Rights, SLC, UT

WESTFAST

Patrick Lambert, Federal Liaison, Murray, UT
Becky Fulkerson, Bureau of Reclamation, Washington, DC
Sonya Jones, U.S. Geological Survey, Atlanta, GA
Chris Carlson, U.S. Forest Service, Washington, DC
Bradley Doorn, National Aeronautics and Space Administration, Washington, DC

STAFF

Tony Willardson
Michelle Bushman
Sara Larsen
Cheryl Redding

WELCOME AND INTRODUCTIONS

Tim Davis, Chair of the Water Resources Committee, called the meeting to order, and requested introductions be made around the room.

APPROVAL OF MINUTES

The minutes of the meeting held in Bismarck, North Dakota on July 14, 2016 were moved for approval by David Schade. The motion was seconded and the minutes were unanimously approved.

SUNSETTING POSITIONS / REVIEW POLICY POSITIONS LIST

Chairman Tim Davis specifically asked the Committee to review the comprehensive listing of the current positions as listed under Tab C in the briefing materials. Please note if there is any topic for which the WSWC should have a position, but do not. If it appears a position is missing comprehensively, please let us know.

Tony mentioned there are some positions that could potentially be “lumped” together. He noted also that we may need to look more closely at infrastructure.

Position #356 was moved for approval by Jerry Rigby and the motion was seconded. The position was approved by the Committee with no discussion.

Position #357 was formerly adopted as a letter to the House and Senate. It has been revised and is now in the form of a resolution. The position was moved for approval, which was seconded by Jen Verleger. The position was unanimously approved.

WESTERN GOVERNORS' ASSOCIATION (WGA) WATER-RELATED ACTIVITIES

Troy Timmons, Director of Strategic Initiatives, commented that WGA met last week in Montana with Governor Steve Bullock on his initiative during the course of his tenure as WGA Chairman. Governor Bullock's initiative is National Forest and Rangeland Management.

Specifically, they reviewed work on the Upper South Platte drainage in Colorado with respect to wildfires and drinking water supplies. Since the early 2000s, and on a regular basis, the Upper South Platte drainage supplies about 70% of the Denver metropolitan area's drinking water. Every 4-5 years, Colorado has experienced devastating wildfires in that area. In the spring, they've received heavy rains that then carry silt and that impact water quality standards. The Governor's initiative creates a mechanism for states and land managers to share best practices and policy options for forest and rangeland management. Under his leadership, they

will try to determine how to coordinate between federal and state land managers and private property owners to mitigate issues on forest land. The cycle repeats itself throughout many western communities, with devastating wildfires, that cause water quality issues, that not only affect drinking water, but also fish habitat and wildlife as well.

WGA is seeking other examples where we've been able to identify a problem and come up with responsible and smart solutions on a collaborative basis to improve habitat and water quality as well.

Zach Bodhane manages the WGA "Species Conservation and Endangered Species Act (ESA) Initiative" of Governor Matt Mead, and works on wildlife policy, including the Endangered Species Act. Zach is tasked with looking at what has worked and what hasn't with respect to species conservation. He has advocated for species conservation outside the Act. Zach related that the WGA will be handling the forestry and range initiative under a similar structure with how the ESA initiative has been handled. WGA will hold a series of meetings and questionnaires. They want to have as much conversation as possible. WGA has been impressed with the results received under the ESA initiative. They received a lot of input and feedback, and are now trying to delve deeper into the issues that arose across the board.

Key ESA themes that have emerged include: (1) how to incentivize voluntary action; (2) the role of state and local governments; (3) landscape conservation – looking at ecosystems; (4) investing in science and measuring/monitoring outcomes; (5) species conservation – habitat conservation planning; (6) law and policy – looking at the role of litigation and how it has shaped the Endangered Species Act over the years; (7) employing regulations if the Act is not going to change; and (8) how to consider regulatory actions.

WGA plans to host a series of work sessions in the coming year and may limit each session to about 50-60 people. Funding and other issues will be considered with a team of facilitators. They need to look at the on-the-ground realities.

Additionally, WGA will have a robust webinar series on legal authorities around landscape conservation and what definitions need to be in place. They are considering bringing in a broader group of folks. They need to reach out nationally to bring in and include folks east of the Mississippi, bringing them into the conversation, particularly with respect to their experience with the ESA.

WGA will build a matrix of all of the issues that arise from these sessions and webinars and will seek recommendations or ways to make improvements either with statutory or regulatory fixes.

Feel free to email Troy or Zach with suggestions for potential case studies.

Discussion

Pat Tyrrell: What kinds of things are you looking for with respect to the case studies – things specific to fire?

Troy Timmons: Projects that have the benefit of improving aquatic or wildlife habitat and/or water quality. The Upper South Platte example is one that “punches you in the nose.” We are looking for clear-cut examples. We would not limit it to projects that affect water quality for humans, but are interested in projects that are improving fish and wildlife habitat as well.

James Eklund: In the Rio Grande Basin, we have the Colorado greenback cut-throat trout. We were just sued by the Center for Biological Diversity. We want to get in touch with you on the headwaters in the system.

Troy Timmons: I would love to have a conversation with you. We are having a number of workshops. We will be meeting in Boise next month, and will be in several other states as well. We will likely be in Arizona, as they have some of the same dynamics with lands the Salt River Project manages as you’re experiencing in Colorado. The Rio Grande issue sounds like it would be a good case study.

Tim Davis: Tony suggests we may want to put together a small workgroup to discuss case studies, if anyone is interested. Those who indicated an interest in participating in the workgroup included: Tim Davis and James Eklund. We will send out an email and gather folks together on a quick phone call to discuss those case studies.

CDWR/WSWC WORKSHOP UPDATE

Jeanine Jones reported that Sub-Seasonal to Seasonal workshops were held over the past year, and a draft report summarizing that series of workshops has been shared with some of you and is posted on the website. This produced great engagement with NOAA on how to move the ball forward on this subject, which is hugely important for water management, but also a difficult scientific challenge.

Additionally, one workshop on Irrigation Management Information Systems (IMIS) was recently held. This workshop addressed existing networks and their capacity among network operators (operators of irrigation weather measurement stations). Jeanine shared that the major finding was that, like other data programs, we didn’t realize what bad shape, with respect to funding and resources, that these networks were in. California has a large network called CIMIS and its budget is about \$1 million per year. The intent in the original contract was to look at the networks in interstate basins to find out if California’s neighboring states were interested in exploring the IMIS concept. California’s IMIS has also worked with NASA and the agricultural community to put in ground truthing networks.

The WSWC report found that other systems have very minimal budgets, and this effort became sort of an inventory of weather station networks that enable the use of irrigation scheduling information to improve ag water use efficiency. The budget numbers tell the story. California spends \$1 million per year. The next largest network is the Bureau of Reclamation's AgriMet network with a budget of \$300,000 per year. Utah has a budget of around \$400,000. Most networks are in the \$50,000 range. Many of these networks are university networks, not state agency networks, and they are very resource limited. There are potential opportunities out there, but it would take a lot of capacity building and more funding to get the data. Council staff will be doing a summary report on this activity. It will eventually be posted on the Council's website.

Tony Willardson remarked that executive summaries for both reports are under Tab E in the briefing materials, and they are both posted on the WSWC's website. Hard copies of both draft reports were also available. Comments and/or changes to both reports would be appreciated within the next couple of weeks. He then expressed appreciation to Jeanine and the California Department of Water Resources for their support and funding.

U.S. ARMY CORPS OF ENGINEERS (USACE) LEVEE AND DAM SAFETY ISSUES

John Moreno, Chief, Business Technical Division, South Pacific Division addressed the Committee using a powerpoint presentation.

Mr. Moreno provided an informational briefing on the U.S. Army Corps of Engineers Dam Safety Program. The program has a very well-defined command structure as they are part of the Department of Defense. Commanders are military members and are responsible for dam and levee safety. Appointed dam safety and levee safety officers are civilians who are designated to carry out the management of the program. The Corps has set up several centers, one in particular known as the risk management center, which is a virtual center that oversees and provides a lot of the governance for managing the dam safety and levee safety programs.

The governing document for USACE - Safety of Dams: Policies and Procedures can be found at Engineer Regulation 1110-2-1156 <http://www.publications.usace.army.mil/USACE-Publications/Engineer-Regulations>. This document prescribes how they manage the dam safety program and covers water control plans and deviations processes. It includes fourteen guiding principles with "Public Safety" and "Do No Harm" enumerated as guiding principles one and two. Whatever action is going to be taken, the Corps needs to keep in mind the "Do No Harm" principle and not adversely affect public safety.

He reviewed the Dam Safety Action Classification (DSAC) status of the South Pacific Division's portfolio, where the Corps has 711 dams. They classify each of the structures on a risk-screening matrix. The characteristics of each are also indicated. This matrix drives where the funding is moved to identify structural or non-structural solutions. Category 1 includes very high urgency of action. In the Albuquerque District, many of the dams are in category 3 or 4,

meaning the urgency of action is moderate to low. Santa Rosa dam in New Mexico is rated as “5” with normal urgency of action. The ideal is to move the majority of the structures to the higher number classification. They are doing the same process with levees to address the management approach for them. The Corps has about 2500 levee systems nationally which they evaluate.

As annual inspections, periodic inspections, and periodic assessments occur it helps to determine the ratings (shown on the slide). Mr. Moreno’s powerpoint presentation is posted on the WSWC website. These assessments or routine inspections have a lot of local and state participants. For projects identified as having issues or that require modifications, the Corps uses a separate pool of dollars – outside of the annual appropriation of operation and maintenance funds to focus efforts on the portfolio to address and advance these projects. The intent of the national screening is to look at the portfolio as a whole and take the risk information derived from the screenings, then to hone in on those structures that need to be advanced in terms of studies. There are two types of studies: issue evaluation studies and dam safety modification studies.

As an example of a dam safety issue, John provided an overview of a deviation to the water control manual on a DSAC 1 dam - Whittier Narrows Dam. He explained that the Water Control Manual and Plan Principles are an overarching document. The plan is very prescribed to recognize that the dam was built and authorized by Congress for a specific purpose. The releases are well prescribed. The Corps understands that the plans cannot remain static. Many of these dams were built 40-50 years ago. Sedimentation complicates matters. The plans must be adapted to the changing conditions. Again, this follows the “Do No Harm” principle.

Whittier Narrows Dam is part of the Los Angeles County drainage. There are several dams in the area. The Corps wants to support LA County’s desire to be able to hold more water. It is part of a groundwater recharging effort. They do spreading with some of the waters released. Many of the structures are dry structures but some have recreation purposes behind the dams. There are risks associated with them, particularly with the downstream channels. Frankly, the downstream channels do not have the capacity to push what the outlet works may release. There are some concerns on the flood control side, although the Corps does recognize the current drought conditions, and the concern with being able to capture and most efficiently manage what water is flowing through the structure.

Whittier Narrows was built in 1957 for flood control purposes. The dam is rated DSAC-1 high risk due to the large population downstream, which factors high into the risk assessment that was done. A dam safety modification study is in progress. The water control plan was approved for incidental water conservation in 1978. Operations are closely coordinated with the Los Angeles County Department of Public Works.

The Corps’ deviation policy was outlined by Mr. Moreno. Certain authority levels are delegated from the Chief of Engineers down through the regional command, and policy is developed. Mr. Moreno noted that a minor deviation consists of a change of 5% or less in

volume of the total storage of the reservoir and/or no more than 2 feet in elevation. It may not be more than two years in duration. Approval of a minor deviation is given by the South Pacific Division Senior Regional H&H and Water Control Engineer.

A minor deviation was in place from December 2014 to March 8, 2016 at Whittier Narrows Dam that allowed raising the water conservation elevation from 201.6 ft to 205 ft for the flood season (Oct – Mar) to maximize the amount of water that could be used in spreading basins. The pool has reached elevation 205 feet about 15 times since 1958, with the last time occurring in 2011, which was the beginning of the drought. The dam safety threshold begins at WSE of 213.5 ft (backward erosion). A Chapter 24 exception was granted by Headquarters USACE for the duration of the drought. The storage volume is the difference between 205' and 201.6' which is 1,325 acre-feet. At an average rate of \$1,000 per acre-foot of water in southern California, the potential increased saving in water conservation is about \$1,325,000 per storm event. In short, it is a good news story in that the Corps was able to address the sponsors concern with being able to deviate from the normal control plan.

The Los Angeles County Department of Public Works requested a five year deviation for water conservation to elevation 205 feet. The request was declined, for a five year commitment. So, currently the plan is to process a minor (two years) deviation in time for the coming flood season (2016-2018). There are no issues with flood control, dam safety, or policy compliance for a major deviation.

The levee safety program is tracking the dam safety program by about two years. There will be a similar regulation. A dam safety officer is also appointed as a levee safety officer. There are also levee safety vegetation management concerns. PL 84-99 guides the USACE Emergency Management Authority. That program has several components and activities that include: preparedness, response, **rehabilitation**, water assistance, advance measures, and hazard mitigation. Rehabilitation is highlighted because the rehabilitation functions as an insurance program for those levee systems where the federal government has a role. The applicable Federal regulation and the Engineer regulation are being updated to reflect better alignment with national preparedness and response frameworks. New eligibility requirements are being developed and will incorporate stakeholder feedback.

The documents have not been updated since 2001-2003. Two of these documents have not been updated since the 1980s. It is well understood by the Corps that they have challenges with how they apply levee safety vegetation guidelines. The program is still evolving and rulemaking is being advanced, although they are trying to get more resiliency incorporated into the program. The Corps is not using vegetation as an eligibility requirement right now and are allowing stakeholders to provide input into the program.

Levee safety inspections and risk screenings are still done by the Corps and will be used to inform non-federal sponsor actions, but not to regulate. The Corps' responsibility is to supplement the local entity responsible for the levee to help come up with solutions, and not to dictate.

Questions:

Jeanine Jones: With respect to reservoir reoperations and major deviations, you alluded to resource issues. I know there has been language in the WRDA bills about [non-federal] contributed funds and that kind of thing. Could you elaborate on that a bit?

John Moreno: I don't know just where that money comes from. I think initially, we have to account for it out of our annual appropriations. If something is unplanned for, we have to figure out how to address it. I don't know at the national level whether or not they will be able to set aside or allocate some funds on a central basis to deal with these issues. We get funds with our 408 permit issues as well. They take a lot of effort in terms of technical processes and engineering. These take a lot of data and can cost several million dollars, and can take up to three years. There are challenges and it is no small undertaking. I cannot point to the exact sticking points, however these are some of the challenges. These issues typically come up as unplanned requirements. I know a lot of our stakeholders would say they would gladly pay. With our federal government, it is hard to get money. Nevertheless, I would urge you to keep pushing.

Marty Ralph: I appreciate your summary of Whittier Narrows. Can you describe who might ask for a minor deviation and when that might happen for this coming two year period?

John Moreno: LA County Public Works office will be actively working initiating a request. It would flow through the Corps' Los Angeles District. If there was a new one coming up, I would tell you to coordinate with your respective district. Tell them what you want to do and how you'd like to get there in terms of minor or major deviations.

Walt Baker: In Utah, we have a large wastewater treatment plant that discharges to a creek that has a levee under the auspices of the Corps. The county manages and implements the things you have described. Regarding the concept of "Do No Harm," the county assesses the vegetation and they are de-nuding the levee and channelizing a stream (to prevent flooding), which, in turn, is incongruent with maintaining and sustaining a fishery. Help us understand how we can bridge this gap and accomplish both of our goals. What rules and policy govern this? It is challenging.

John Moreno: We are empowering the locals on management approaches with respect to vegetation variance or a System Wide Improvement Framework (SWIF). The Corps' stance is to empower the local entities to come up with some solutions. In other words, a management approach that may be something other than a one solution fits all approach. I understand there are environmental issues and multiple inputs. My take is that the way we've written our policies may seem quite stringent, however, we understand situations can be different. It is a lot about risk communication as well. I believe there is some flexibility afforded the local entities to come up with solutions that are not so black and white.

SECURE WATER ACT: CLIMATE CHANGE REPORT TO CONGRESS

Katherine Dahm, Water Resource and Planning Division, U.S. Bureau of Reclamation, addressed the Committee remotely with respect to the SECURE Water Act. She expressed appreciation for the invitation to speak to the group, and in particular the flexibility to present remotely.

In March 2016, Reclamation published the SECURE Water Act report to Congress. The report is over 300 pages. It is Public Law 111-11 Subtitle F – Section 9503. As an overview, Section 9503 requires that Reclamation produce a report to Congress every five years on implementation of climate change adaptation activities under the SECURE Water Act. The first report produced under the SECURE Water Act was in April 2011. The second report, the one we are addressing today, provides an update to the 2011 report. It also includes recommendations on Reclamation’s work to date with stakeholders.

The 2016 report provides a west-wide overview of anticipated impacts to water resources due to climate change and corresponding adaptation strategies considered through collaborative studies. Chapter 2 includes a hydrology and climate assessment summarizing the projected hydrology and climate, impacts to water supply and demand, climate monitoring, research, and coordination. Chapters 3-10 each focus on one of the major river basins that have been identified in the SECURE Water Act and summarize implications for various water and environmental resources, adaptation strategies, and coordination activities. The major Reclamation river basins listed are the Colorado, Columbia, Klamath, Missouri, Rio Grande, Sacramento, San Joaquin, and Truckee River Basins. Reclamation’s WaterSMART Basin Study Program activities are authorized by the SECURE Water Act.

This technical assessment report provides an analysis of changes in hydroclimate variables; namely: precipitation, temperature, snow-water equivalent, and streamflow across the major Reclamation river basins, and it is the technical foundation for Chapter 2.

The effects and risks of climate change are covered in the report. They focused on the observed increases in mean annual temperature and timing and quantity of runoff which is expected to continue to be impacted. April 1st snowpack is key. As water managers in Reclamation, we understand the importance of snowpack, and we recognize that snowpack changes are critical. There is much more information in the report on all the specific projections.

Collectively, the impacts of climate change on water resources give rise to difficult questions about how best to operate Reclamation facilities to meet growing demands for water and hydropower now and how to upgrade and maintain infrastructure to optimize operations in the future. Reclamation is looking at all of the western river basins and preparing summary statements for all of the categories in the SECURE Water Act, focusing on water deliveries.

Climate assessments project that the manageable water supply, in general, will decline in much of the West. Anticipated impacts on water supplies and water operations include: water

deliveries, hydropower, recreation, flood management; fish, wildlife & ecological resources; water quality; groundwater management; and watershed integrity.

A key difference between this report and the 2011 report, is Reclamation has since initiated 26 WaterSMART basin studies, which: evaluate portfolios of adaptation actions, summarize accomplishments and current/on-going actions implementing the climate change strategy, and look at information from the WaterSMART Program on current actions.

Ms. Dahm described and “walked” through the wheel of strategies. She noted the focus on supply augmentation, water reuse and desalination, water rights acquisition, imported water, and surface and groundwater storage.

Moving around the wheel, the next solution is Demand Management, which covers: municipal and industrial water conservation; agricultural water conservation; evaporation control; and water marketing.

System Operations is an interesting area that Reclamation is now working on. The system operations include: modified reservoir operations; conjunctive water management; hydropower modernization; and infrastructure modifications.

Activities also cover Ecosystem Resiliency to improve water quality, invasive species control, recreational and environmental flows, habitat restoration watershed management.

The final solution of the wheel is Data and Information to improve observational data, modeling tools, and data access.

WaterSMART Basin Studies evaluate portfolios of adaptation actions.

A companion tool is a web-based application. It highlights the report findings and references the interactive data and allows the public to access and interact with climate data.

Ms. Dahm highlighted the SECURE Water Act Report findings, which include: (1) Projected increases in temperature will increase rainfall-runoff during the cool season, rather than snowpack accumulation; (2) Changes in the magnitude and timing of water will impact the ability of existing water infrastructure and water management practices to satisfy competing water demands; (3) Portfolios of adaptation actions will be necessary to mitigate the impacts of climate change; and (4) Collaborative planning activities in each watershed and west-wide are needed to build climate resiliency.

A WaterSMART Progress Report was done in 2012 which highlighted program accomplishments. WaterSMART activities highlighted in the report included the Basin Study Program; Title XVI Water Recycling and Reuse Program; WaterSMART Grants; Drought Response; Cooperative Watershed Management Program, and the USGS Water Availability and

Use Science Program. Reclamation has also been coordinating with the Forest Service on the Western Watershed Management Program.

Reclamation is also working on an interactive web-based tool for the WaterSMART Program that will be released soon allowing the public to identify and interact with funded projects. It is a visualization of the report narrative, and it offers downloadable datasets. It should be released in October 2016.

GROUNDWATER and COLORADO RIVER BASIN STREAMFLOW

David Susong, Utah Water Science Center Director with the U.S. Geological Survey (USGS), reported on a study in the Upper Colorado River Basin that was done as part of the WaterSMART program under the USGS Water Census.

Mr. Susong mentioned that he wanted to provide a little more detail on looking at streams, groundwater, and the annual stream hydrograph. He will present the results from work in the Colorado River Basin, looking at the importance of groundwater discharge to streamflow. He also hopes that after hearing the presentation, when one looks at a stream or a streamflow hydrograph, one may think a little differently about where the water has come from, how it got there, and the components of the flow path of the water as it comes down the stream. The work on the Colorado River Basin area study focused on topics they hoped had not already been studied over the years. The project study included four main components: (1) evapotranspiration; (2) snowpack hydrodynamics; (3) water use information; and (4) groundwater discharge to streams.

Nearly everyone has likely seen a block diagram of how water enters a stream – water runs off over the surface, it flows through the shallow soil zones, and it also comes into the stream via the groundwater feeds. The study concentrated on stream geomorphology and hydrographs and groundwater. To provide examples, David showed pictures of Soda Butte Creek which has its own regime and flow system. This stream has a large graded channel which moves across the floodplain. It takes out the bank in one place and deposits new material in other places. He contrasted Soda Butte Creek with the Gibbon River, which stays inside its banks, and does not move much sediment. It is an entirely different type of flow regime and flow system. Both are within Yellowstone National Park and there is really no anthropogenic activity – no dams, no diversions.

David showed a slide of these two streams' vastly different hydrographs. They are similar in the size of drainage basin, elevation of the gages, and the period of record. Looking at the mean annual daily discharge, they are in relatively the same ballpark. However, he noted that the streams behave very differently and the groundwater base flows can be disparate.

The focus area study objectives included making determinations on the importance and relevance of discharge of groundwater to the streams. USGS work to: (1) determine the spatial distribution of groundwater discharge to the streams (where is it occurring); (2) quantify the

fraction of total streamflow that is supported by groundwater discharge (how much); and (3) quantify the age of groundwater in the Upper Colorado River Basin (UCRB). USGS also considered vulnerability – how the stream will adjust and respond -- to climate change projecting streamflow and groundwater recharge.

The long-term discharge and specific conductance data collected by USGS were used for chemical hydrograph separation. The data used for the present study was collected between 1984 and 2012. At 229 sites across the basin, USGS has long term records. Groundwater discharge to the streams was estimated at each of these 229 sites. At some of the sites, USGS has continuous specific conductance measurements with probes. They also use instantaneous measurements that are done over the course of a year. They then build progressions to estimate daily conductance.

They built a Sparrow model to determine the spatial distribution of groundwater discharge. Most groundwater discharge to streams occurs in the upper elevation catchments. This is expected as a result of precipitation. Climate change in high elevation systems will affect the groundwater resources, and therefore the amount of surface water in streams. Throughout the basin they estimate that about 14.5 million acre feet per year (maf/yr) of groundwater is discharged to the streams in the Upper Basin on the Colorado River. Some 2.7 maf/yr of water is delivered to the Lower Basin that originated as groundwater. The amount of water lost during in-stream transport is due largely to irrigation withdrawals, stream losses and evapotranspiration. About 90 million acre-feet (maf) of precipitation falls across the Upper Basin in any given year, while 65 maf is taken up as evapotranspiration.

David showed a slide with examples of various rivers, some that are groundwater discharge dominated, and others (in more arid regions, without a lot of snowpack) with a smaller groundwater discharge contribution. He commented that the Yampa River is highly affected by snowpack runoff, and about 34% of the total streamflow comes from groundwater discharge.

Looking at the fraction of groundwater discharge and the streamflow sustained by groundwater, on average 56% of UCRB streamflow is estimated to be from groundwater discharge. Streamflow in lower elevation catchments are more dependent on groundwater discharge than are high elevation systems. These streamflows support the habitat many are working on in the UCRB.

The study looked at the age of groundwater in the Colorado River Basin. USGS used large springs in the basin as a surrogate to collecting samples from individual wells. They did this because a spring integrates flow from a number of flow paths, then it discharges to the surface, which gives an integrated age signal. They use those ages to make an estimate of the overall age of the water within the basin. About 20 large springs across the basin were sampled, and many of the springs had either state or federal fish hatcheries. The results showed that about 20% of groundwater is less than 10 years old, and 65% is less than 100 years old.

The relatively young age of groundwater suggests a potential rapid response to changes in environmental conditions. USGS had fewer samples than they would have liked for this study as the samples are fairly expensive. The take home message is that the groundwater is relatively young, so if you start to see the effects of any kind of global change, it will begin to show up within a 10-year period, and certainly within 100 years.

Mr. Susong concluded with a summary and implications (key points) from the study, noting: (1) quantitative estimates of groundwater discharge to streams indicate that groundwater and surface water are a single resource, and almost half of the streamflow in the basin moves through the groundwater system before it discharges to the stream; and (2) any process that affects the groundwater resources will also affect the surface water resource. These results are being used to: (a) develop a tool to assess climate impacts on the joint groundwater-surface water resources in the UCRB; (b) improve our understanding of salinity sources, transport, and temporal trends in the UCRB; and (c) develop similar estimates of groundwater discharge to streams in other watersheds, including a WaterSMART focus area study in the Rio Grand Basin. USGS is also beginning to use the tools in the Great Lakes watershed as well.

WATER RESOURCES IN THE APPLIED SCIENCE PROGRAM OF THE EARTH SCIENCE DIVISION AND WESTERN WATER APPLICATION OFFICE (WWAO)

As Program Manager for NASA's Water Resources Applied Science Program, Brad Doorn stated that the manager's mandate is to help state water resources program managers and others, given the tools the program provides, to make sure folks can manage water resources the best way possible (with NASA's data). Brad communicated NASA's desire to see things end to end. They like to see the space observations used for irrigation management -- all the way down to the ground. As they evaluate their applied research, they expect to have not only the space observations, but the stakeholders involved from day one. NASA would like to see the stakeholders as the program managers for the projects. Stakeholders are involved and must prepare a transition plan for the projects, so they are actually transitioned to operations upon completion.

Over the past five years, NASA has spent quite a bit of money on the topics of drought, in-season forecasting for water resource anomalies, and water quality and agricultural water use. These topics were decided upon by coming to meetings such as this and talking to water resource program managers. The water resource community is also represented in the selection of the projects. Stakeholders are involved in the decision process as to which projects are selected. It is also highly competitive. NASA does not manage water resources.

NASA observations were creeping in from the oceans with their science and technology and getting better information on the coasts. For coastal states, they can start making an impact. It will take some time to get direct observations for water quality more inland. USDA and California (applied users) are becoming involved in the development of missions that NASA is launching.

NASA has an extensive ground system in place. Dollar-for-dollar, investing in better ground processing, better high-level data products, can have a better impact than launching a satellite. Brad intends to spend more time getting this data better integrated and more useful. The Earth Science Data are held at Distributed Active Archive Centers to provide knowledgeable curation and science-discipline-based support.

Brad highlighted the WestFAST team collaboration. NASA relies on interagency agreements and partnerships. Much of what Brad does is tie agency actions together.

In 2016, the President authorized the formation of the Western Water Application Office (WWAO) at the White House Water Summit to address three initiatives. The first is western water issues. This is not a new mandate to manage water resources. It is meant to spend more time and attention on applied research on western water issues. The same will be done for global food security and disasters, all of which have water cycle components to them. The WWAO will support the strategic development of key applications from satellite observations and airborne technologies to maximize their use in order to better meet challenges.

Brad turned to his colleague, Randy Friedl, whose is leading the effort at the Jet Propulsion Lab (JPL). Brad is running the applications program that is nationally based using NASA tools. NASA has recognized the importance of having more focus on the areas in which they can have an impact with their tools. NASA Ames and NASA JPL have worked with many Council members on western water issues. The WWAO will try to obtain a critical mass in bringing to bear NASA capabilities on western water issues. This office will connect stakeholders with NASA scientists, technology, tools, and data. WWAO will also develop custom solutions through applications projects. Additionally, it will assist applications transition to an operational state.

WWAO will apply NASA's wealth of science, remote sensing data and expertise. NASA will leverage decades of investment in science and technology. NASA has a satellite in orbit now measuring soil moisture. They have follow-on satellites that will be measuring changes in groundwater through its Gravity Recovery and Climate Experiment (GRACE). Two additional satellites are in development, one called SWATH to measure surface waters/river flows over the globe. The other is called NISAR, in conjunction with the Indian Space Agency, that will be working with NASA looking at very small deformations, so it can help with levee safety and other issues of ground deformation.

In preparing for all of those missions, we develop airborne capabilities to vet them. NASA basically has an armada of leading edge technologies around those kinds of space missions that can be deployed on local and regional scales. Brad's office has been funding some of these efforts. We want to start targeting some of these projects in conjunction with the satellites into making information products that will have an impact on some of the decisions water program managers are making. Further, we hope to develop and maintain lasting relationships with stakeholders.

The formulation of WWAO began at a workshop hosted in 2014 at the Jet Propulsion Laboratory in conjunction with a WSWC meeting. At that time, we scoped out how a western water application office could be able to make a difference in conjunction with western water resources managers' needs. We have tried to vet our needs and your needs and scope out how a western water applications office would operate. We conducted internal and external reviews of water needs.

Stephanie Granger, my colleague, is here and is familiar to many of you. She led a review with a number of outstanding external colleagues. We started with the results of the 2014 workshop held with the WSWC, and we pulsed this group to look at the needs and to determine the impacts of NASA data.

The initial assessment of the external review committee highlighted the need to consider and highlight cross-cutting water issues, especially when it comes to policy and climate. Given the amount of money available for WWAO, the review committee suggested we work to strategically target specific basins. NASA believes this is an important piece of advice. An initial pilot study will focus on the Colorado River Basin. The WWAO is working to get a contract in place for a consultant to conduct a market survey. The survey seeks to better characterize public and private decision-makers in terms of primary responsibilities, key decisions, annual revenue and revenue sources and operating budgets.

They have organized the needs into five groups, including: water supply and availability, consumptive use, water quality, water infrastructure, and cross-cutting needs which encompass technical and sociological challenges and climate change and extremes. The other side of the coin is to marshal the NASA capabilities in a larger effort than research topics that Brad has been funding. It will be a much more concerted effort between NASA centers and stakeholders, and thus harness NASA capabilities for stakeholder needs.

Two such projects that advance NASA water resource efforts that are funded and underway include: (1) to integrate airborne snow observatory results into an operational run-off model (that the state of California is working on); and (2) to upscale the successful fallowed land mapping project to the states of Nevada and Washington.

Randy highlighted an example of matching NASA's capabilities with needs, showing a slide that indicated how NASA JPL coordinated synchronized observations of spaceborne SAR sensors, high-resolution airborne optical sensors, and field crews on the ground with respect to the recent flooding in Louisiana to try to identify inundation areas. This was done in concert with other entities (FEMA, NOAA, and USGS). This effort was found to be very helpful to the response agencies. NASA would like to be able to emulate this kind of work on a more consistent basis for western states water resources.

In FY 2017, they will begin formulating end-to-end projects. They will call for proposals that can be done in less than two years and that cost less than \$100,000. They will begin a

NASA capabilities working group. In the second quarter of FY2017, they will call for proposals for more substantive projects – those that would cost more than \$100,000. Later in 2017, innovative approaches will be explored and initiated. NASA Headquarters has given the WWAO a mandate not to be too constricted by the typical NASA approach to project selection and execution of research tasks. They will be exploring ways of partnering with other organizations to identify data information needs and figure out ways that organizations could use NASA data in conjunction with other datasets for decision making purposes.

This new office represents an increased NASA commitment to regional support of western water issues. This will enhance NASA’s footprint and engagement with local and regional needs. They will be better able to work with stakeholders at all levels, including regional, state, and municipal agencies. The WWAO will begin developing innovative approaches to identify and quickly fund projects that have potential for high impact, such as was done in Louisiana.

The WWAO is open and embarking on critical activities, such as needs assessment and capabilities identification. They look forward to continuing dialogue with the WSWC as they move forward.

UPPER RIO GRANDE BASIN SNOWFALL MEASUREMENT & STREAMFLOW FORECASTING IMPROVEMENT PROJECT

David Gochis, Scientist, Research Applications Lab, National Center for Atmospheric Research (NCAR) gave a summary of the Upper Rio Grande Basin Snowfall Measurement and Streamflow Forecasting (RIO-SNO-FLOW) Improvement Project in the Rocky Mountains. They are trying to fill some gaps in this data sparse area. The project encompasses the southern San Juan Mountains, the Sangre de Cristo Mountains, and the San Luis Valley in Colorado. There is a large collaborative team working on the effort of making novel observations, as well as using the observations to make seasonal water supply forecasts, and putting those forecasts in the hands of users. The NASA Airborne Snow Observatory group as well as the NOAA Severe Storms Lab, are involved. The primary motivator is the Colorado Water Conservation Board – Joe Busto and James Eklund.

The challenge is that western states have water, but the demand is outstripping the supply. Many systems are fully or over allocated. The prospects for ‘new’ water development are limited. Additional challenges involve managing damages as a result of errors in water supply forecasts that come in the form of economic losses, particularly to agriculture, but also to other users as well as compact violations and litigation, limited growth, and uncertain habitat conditions.

Though the goal is to reduce uncertainty, we have insufficient “water intelligence.” Water intelligence is the combined body of knowledge from what we are able to observe on the landscape (in terms of what is falling from the sky, and what is being sucked back into the

atmosphere). This consists of inadequate precipitation, snowpack, soil moisture and streamflow observations. It is also the problem of non-stationarity and high variability in the West, which greatly invalidates many statistical methods that have been used for decades. Historical models are unable to integrate real-time observational data, since they are highly calibrated to past conditions. Furthermore, the “water data hub” (where we are actively pulling in all of the water data and modeling information possible) is fractured or incomplete. The goal of water intelligence is to bring things together to reduce uncertainty, not just to characterize uncertainty. They would like to bring the new observations to bear on reducing uncertainty.

The State of Colorado has a very complicated and difficult compact delivery requirement to the State of New Mexico. In terms of being able to make and meet the terms of that compact agreement, Colorado needs to start managing water on April 1 (or before) in order to make sure they deliver the proper amount of water to New Mexico by October 1. This culminated in a single-year, single-basin study, known as the RIO-SNO-FLOW Project. They rely heavily on forecasts. When the forecast is inaccurate, it translates into millions of dollars in water value that were lost. They need better skill in water supply forecasts to better meet interstate compact agreements and requirements.

Their research questions was: “Can improved observations of precipitation and snowpack really help improve seasonal snowpack and streamflow predictions?” This is occurring in a place in the West where the front-line ability to measure precipitation does not exist. The NEXRAD ground radar was validated by observations, particularly for winter precipitation. In Colorado, in the Upper Rio Grande River area, there is essentially a radar black hole, as is the case in several other areas throughout the western United States. Thus, they rely on a very sparse network of surface precipitation stations to characterize the precipitation that is falling over very complex terrain.

The RIO-SNO-FLOW Project collaborative deployed some research radars in the basin, as well as deployed other assets such as the NASA Airborne Snow Observatory (ASO), and fused it into a state-of-the-art modeling system to determine if they might be able to make progress on seasonal water supply forecasting. Water observation and prediction research is emerging on multiple fronts.

In the 2015 water year, research radar was deployed for the entire winter in the San Luis Valley. Two airborne LIDAR over-flights were done by the NASA ASO team. A number of additional in-situ winter hydrometeorological winter stations were deployed in this area of the Upper Rio Grande Basin.

NCAR used the same modeling system that is the underlying modeling framework for the new NOAA National Water Model. A graphic in the presentation shows the flow of information from the radars through a land surface model and routing processes. They have essentially set up a research instance of the National Water Model configuration. They have different physics and a lot of different data feeding into the model.

As a result of this project, they were able to prototype the beginnings of some kind of “water data hub” to provide improved water intelligence. The prototype uses ensemble weather forecasts. Performance can be tracked throughout the year in terms of measured versus modeled streamflow. What is available from the real-time NEXRAD radar network makes it clear that the precipitation occurring within the basin is virtually absent in the operational radar product, and therefore, there would have only been a few SNOTEL stations to provide precipitation estimates.

Ground validation of the radar shows there is a strong correlation between the radar and SNOTEL sites. Through the project, NCAR is trying to improve the model’s ability to track the snowpack throughout the year. A comparison of snowpack estimates indicates there is a lot of improvement needed.

Looking at forecast mode, which was done in water year 2016, an experimental version of a model on the Upper Rio Grande system shows that experimental bias-corrected forecasts are equal to or better than current operational forecasts. The WRF-Hydro forecast takes into account a much wider range of variables than the older NRCS forecasting products. The district engineer who is responsible for making decisions in this river basin said he found value in having the forecasts available. Early in the season, through these products they had the ability to represent the spatial distribution of snowpack across the landscape.

In terms of the outcomes from the RIO-SNO-FLOW Project, they had successful partnerships between local-state-federal-academic partners. Many folks out in the field, as well as folks in their offices were really able to dig into the data. From the beginning, the research to operations was “baked-in” due to the nature of the partnership. They would like to expand this to additional domains to evaluate the robustness of this capability and to quantify the value of improved forecasting.

The presentation given by USGS this morning was good in pointing out that what is happening in the headwaters can be much different than what is on the mainstems. This was certainly a headwaters-oriented project, but that is where a lot of the water originates, and we need to find out how much value there is in extending this capability downstream into the mainstem rivers where the water managers will have proportionately a lot more influence on what is going on. A number of opportunities exist.

Questions:

Randy Friedl: Given what David Susong said earlier about groundwater infiltration, how well does your model capture groundwater flows?

David Gochis: Right now it is not doing deep groundwater. Groundwater is not really included. It’s got a vadose zone model, so it’s doing shallow, near surface/subsurface soil moisture. It’s not just a surface runoff model. It has parameterization for baseflow. It is not a full aquifer system model. The development of a full groundwater system in the National Water Model is an outyear activity that is scoped to be collaborative between the USGS and NOAA. It is a few

years away still. Until then, it will be a parameterized system, but there is a crude representation for groundwater in there.

Pat Tyrrell: There was a slide that showed the anomaly between NEXRAD and the other radar system. What is that a function of?

David Gochis: The anomaly is really a product of a 14,000-foot elevation mountain range which blocks the radar. There is a radar in Grand Junction, but it cannot see over the San Juan Mountains. Research radars can be sited in mountain valley systems to fill in some of the gaps where there is just no other information. Small-scale radar will help fill in the gap. It has a range of around 75-100 miles. Switzerland uses these for their mountains as well.

Marty Ralph: The WSWC requested a report on observing systems needs for the western U.S. for extreme precipitation and water supply. We formed a 28-member team and wrote a paper that is now published. It defines a vision for new observations across the West. It is an expensive plan, around \$200 million. One of the key ingredients was exactly this type of radar. A couple dozen of them in key watersheds across the West could really help. So, this is fantastic results, David. Thanks for your work.

David Schade: How are you going to keep the capability to move this along?

David Gochis: There are ongoing discussions. When you talk about radars like this, it goes way beyond just winter precipitation measurement. There are aviation applications, fire applications, and others. You need to build coalitions to get these things up and running and supported. James Eklund and his group are really trying to do that. We are just providing the evidence. As Marty Ralph said, if we did this, what would we expect to see out of it. This was a trial run. We will be running another study this year to determine if we just got lucky last year or not.

Jeanine Jones: As a quick follow up on the observing system, to give people an idea of the costs. In California, we have been fortunate to work with NOAA and with Marty's group at Scripps to put in the high-resolution extreme precipitation observing system, and between CDWR and California Energy Commission, we have spent \$40 million to install equipment and on research. It requires a lot of money. There is a big jump between the cost of portable radar and permanent systems.

James Eklund: We are trying to cost this out, and considering going toward a permanent radar system. It is expensive. The partnerships are helpful. Thus far, we've found if you get the people in aviation working with you and partnering on funding, it is more cost effective.

NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM (NIDIS) UPDATE

Veva Deheza with NIDIS addressed the Committee. She noted that many of the folks in the room attended the workshop yesterday on seasonal to sub-seasonal (S2S) precipitation

forecasting and forecast-informed reservoir operations (FIRO). Veva explained that the Office of Atmospheric Research (OAR), which is a line office within NOAA, has been working with Jeanine Jones in California and the Western States Water Council on this effort. Within that office, which is the Climate Program Office, we heard from Dan Barry. NIDIS sits within the Climate Program Office (CPO).

There have been some administrative changes within NIDIS that are relevant to the WSWC. Recently a transition happened and Roger Pulwarty stepped down from the Executive Director position within NIDIS. As of August 5, 2016, Veva stepped up to that position. Roger is still with NOAA and is a part of the discussions as a Climate Science Advisor for the CPO, and may take on some additional responsibilities for NOAA.

Given these changes, the NIDIS staff has grown by a couple of people. That has supported a lot of activity. Two regional drought early warning systems (DEWS) were launched, one in the Pacific Northwest and one in the Midwest. The Midwest is critical for NIDIS as it was one of the first early warning systems at the regional scale that is applying the revised Public Law that dictates NIDIS. The Public Law was reauthorized in 2014, and NIDIS is now charged with looking at the role of extreme precipitation events and how their influence droughts and drought impacts on the ground. This will likely transfer into other regional systems.

There are eight regional early warning systems, and they actually came down from nine. There was a Four Corners Early Warning System that was dedicated to tribal activity, needs and gaps for information, but it has been integrated into the Upper Colorado River early warning system. The Upper Colorado has been expanded and it now includes the entire state of Arizona and the western side of New Mexico. Thus, it has been renamed to the Intermountain West early warning system. It still encompasses the same original states, but have added Arizona and New Mexico. The regional activities in California have been expanded to also now include the entire state of Nevada. This was done with close consultation with Governor Sandoval and his staff working with the initiative during his term as Chair of the Western Governors' Association.

NIDIS activities have included expanding our relationships with our federal partners. We are interacting much more the Bureau of Reclamation as they have redesigned their drought program under the leadership of Avra Morgan. We are working more closely with our USDA counterparts as they launch their USDA climate hubs. Most have new permanent directors. Many of these programs are being funded at better levels than when they were originally created. NIDIS is taking advantage of that new structure within the climate hub program and looking at leveraging their activities.

Within the infrastructure of NIDIS, they have reconstituted in the last six months, the executive council. To that end, they have asked the WSWC to play a greater role on the executive council. Tony Willardson has been asked to serve as a co-chair to the NIDIS executive council. This council is a governing body meant to shepherd the NIDIS program. Even though NIDIS sits with the CPO, which sits within OAR, which sits within NOAA, which is under the Department of Commerce, in a sense NIDIS is an interagency program. It is meant

to embody the full complement of federal agencies that are working in drought and working on water supply shortages, and water supply issues. NIDIS is to work not only with federal partners, but also with state partners, with local government partners and private sector partners. Tony has agreed to serve in that role on the executive council, especially as NOAA is positioning itself with its new water center. NASA, NOAA, USGS, and the USBR are positioning themselves to provide more resources to decision makers as they look at water resource planning and management decisions. The constitution of the executive council also brings an opportunity for NIDIS to add a robust private sector piece. They have received positive responses from Deloitte, Google, IBM, and AMAC to serve on the executive council as well. All of these entities deal with large scale water infrastructure and water resource management decisions, not only domestically, but on the international arena as well.

The drought.gov website is currently being revamped. It is considered the United States' version of a drought portal. They are working very closely with the National Drought Resilience Partnership (NDRP), which is part of the President's Climate Action Plan. You all will hear more about this from Tom Iseman tomorrow. NIDIS has been working very closely with the NDRP. NIDIS is considered the foundation to the NDRP. It is the early warning capacity on which long-term drought resilience can be built.

WATER DATA EXCHANGE (WaDE) UPDATE

Sara Larsen provided a brief update on the Water Data Exchange (WaDE) program. Sara noted that California data has been re-introduced. She reported that new state agencies within existing states are now also flowing data, and these include the Utah Division of Water Rights and the Wyoming State Engineer's Office. Thus, there is new information in the portal.

The FY2013 Exchange Network grant obligations from EPA are being closed out. This involves registering the endpoints in their discovery service and sharing the components and databases used to build WaDE in a way that others in the Exchange Network can utilize them, if it fits their purposes. That had been a really big step to close out our obligations of meeting the grant.

A follow on grant between California, Nevada, and South Dakota has been finalized. Now we can bill to the second grant.

More states are slated to be "flowing" data this year, which would bring the total number to 12 or 13. At that point in time we would really like to launch the portal.

Recently, Sara had a conversation with Gary Gearheart of the California Water Resources Control Board. He explained some of the new things they are doing for open data. Gary is one of the administrators for the office of information management and analysis. She also had a conversation with Alaska's Department of Natural Resources and learned of their work on sharing water use data information with their local USGS office.

In terms of outreach, Sara and Pat Lambert met with the USGS Water Availability and Use Science Program leadership in July to demonstrate how WaDE data can be used to access state data and discussed Open Water Data Initiative topics.

Sara presented to the USGS Water Use Forum, with many attendees from eastern states. They had a lot of questions and they were interested in thinking of new ways to provide USGS with their water use data as part of the WUDR grant program. They were excited to see that web services is a possibility.

Additionally, Sara became involved with the Aspen Institute Dialogue Series for Integrated Water Data. Sara observed that the “water data hub” referred to earlier seems to be beginning to coalesce. There are a lot of different agencies, and they all oversee a lot of different data. They are trying to figure out a way to build an application that can make wider datasets available so that you can build applications. This is encompassed under the Open Water Data Initiative. WSWC wants to ensure that the data in WaDE can be incorporated into the OWDI framework, as well as other data on SNOTEL and remote sensing, etc., and become searchable through that framework. There are lots of ways to solve this problem.

Sara introduced Zubayed Rakib and Carly Hansen, interns with the WSWC. They have been very helpful. Carly focused mainly on the IMIS workshop. Zubayed has helped with technical aspects of WaDE and optimizing the performance of WaDE. They have created a product known as automated central catalog ingestion, and have placed the code on platform called GitHub. This makes it possible for IT folks wanting to work on WaDE to sign up as a collaborator within GitHub. They can check out the code for WaDE and the database components and make changes, push the changes back up for certification, and as the program evolves, those changes would be incorporated.

What’s Next? WaDE 1.0, which will include some advancements in the portal for the roll-out. They are working on new ways to search for data; requiring a login for access; and updating the portal interface and tutorials. They are looking for use cases. If states have dedicated customers aside from federal agencies - - people that you typically convey a set of information to on an ongoing basis. This will allow Sara to demonstrate to others how to access the portal and build off of it. Sara needs assistance and guidance, thus she will be soliciting new members for the Water Information and Data Subcommittee (WIDS) as a forum for more discussion. If this is a topic of special interest for your state and you want to help develop WaDE, or you simply want input on priorities, then please put share a name for the WIDS subcommittee with Sara.

The impetus for WaDE came about from working with Sandia National Lab. They were trying to do a comprehensive analysis of water availability and use. When it was done, states were not entirely happy with the analysis they provided to us. To address this kind of thing, we are showing that states have data. The states are familiar with their local districts. They should be able to share that information in such a way that people can find it quickly and easily, with

metadata that allows them to know what it is they are pulling down, and allow that data to be used to build other applications and/or be pulled into federal programs as needed. WaDE allows for this to be done in a very cost effective, very quick, easily update-able way.

There is one segment of data that has not been targeted yet, and that is Phase 2 – and it is observations data. We are looking at starting streamgauges, ground water monitoring, water quality, and similar kinds of parameters for state owned networks. The WSWC is seeking grant funding to put this kind of data into WaDE and into the OWDI.

SUNSETTING POSITIONS

Tim noted that the Executive Committee will be discussing more in-depth preparing for the Administration transition team.

There are four sunseting positions related to water resources for the next meetings being held in Nebraska in April, and they are found in your briefing books under Tab C.

OTHER MATTERS

Tony Willardson reported briefly that the Congress passed a continuing resolution at least through December 9th. Additionally, the Senate passed a WRDA bill that included a number of different provisions and had a price tag of \$10.6B. It included the Blackfeet settlement, a small settlement in California, and a small settlement in Oklahoma entered into between the State and the Choctaw and the Chickasaw. None of that was in the House bill that passed yesterday. This bill was a two-year reauthorization of Corps projects and programs at \$5B. There will be some work to be done in conference to get somewhere between the \$5 - \$10.6B. Members from the House Natural Resources Committee and others who have jurisdiction over some of the provisions passed in the Senate bill will be involved.

There being no other matters, the meeting was adjourned.