

Western States Federal Agency Support Team (WestFAST) is a collaboration between 13 Federal agencies with water management responsibilities in the West. WestFAST was established to support the Western States Water Council (WSWC) and the Western Governors' Association (WGA) in coordinating Federal efforts regarding water issues.

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WestFAST Takes Part in AWRA Panel on Federal/State Collaboration

The American Water Resources Association (AWRA) held its Annual Conference on Water Resources in Denver, Colorado on November 16-20, which included an opening session panel discussion on “Principles of Communication, Cooperation and Collaboration—A Framework for State and Federal Water Resource Agencies.” Jean Thomas, USFS, Water Rights Program Manager, and WestFAST representative, and Patrick Lambert (USGS), current WestFAST Federal Liaison, joined Joan Card, Senior Policy Advisor EPA Region 8, Tom Iseman, Deputy Assistant Secretary for Water and Science, Department of the Interior, and Tony Willardson, WSWC Executive Director, in a discussion of the dynamic relationship between the primacy of the states’ administration of their waters and the supporting and regulatory roles of federal agencies.



AWRA panel from left to right: Jean Thomas (USFS/WestFAST), Tony Willardson (WSWC), Patrick Lambert (USGS/WestFAST), Tom Iseman (DOI), and Joan Card (EPA)

Mr. Willardson reviewed the role of the WSWC as an expert policy advisory body to western governors, providing a collective state voice on water matters and fostering collaboration at all levels. Mr. Willardson stated that the Council’s charge from the western governors has been “to ensure the West has an adequate, sustainable supply of water of suitable quality to meet our diverse economic and environmental needs now and for future generations.” “The challenge,” Mr. Willardson noted, “is to find ways for public entities and private interests to work together to achieve multiple objectives and build a secure and sustainable water supply.” Mr. Willardson also noted “that an important step in that direction was the establishment of WestFAST, bringing together federal

agencies to work with western states towards that future.”

Mr. Lambert (USGS/WestFAST) discussed WestFAST’s role in facilitating collaboration among federal and state water-resource agencies across a range of programmatic and regulatory activities. He noted that “although collaboration is regarded as a key objective and many examples of successful collaboration can be found, proactive federal/state collaboration in some cases is variable in timing and scope.” Mr. Lambert presented a WestFAST proposal to conduct a series of case studies to identify best collaboration practices. “Our hope,” Mr. Lambert said, “is that these studies begin to define a roadmap for agencies to refer to as they engage in rule-making or the development of supportive water-resource programs.”

Mr. Iseman (DOI) reviewed several recent and ongoing water-resource collaborations including the Bureau of Reclamation Colorado River Basin Study, which required a significant amount of cooperation and communication to complete. That study now serves as a foundation for decision making for a range of entities and for future, in-depth assessments of water supply in the basin. Mr. Iseman noted the need for increased “urgency” in understanding and supporting states in water supply issues including drought, and working toward establishing an “affirmative structure and agenda” for water policy and quantifying water supply.

Ms. Card discussed successes and lessons learned in EPA’s involvement in the National Drought Resiliency Partnership’s (NDRP) Montana Upper Missouri River drought resiliency demonstration project. The NDRP was developed to help communities better prepare for future droughts and to reduce the impact of drought events. Ms. Card noted a key to the “all in” approach in the Upper Missouri demonstration project has been the “institutional commitment of time and resources by the agencies involved, and personal” coordination among the project team across federal and state lines.

Ms. Thomas (USFS/WestFAST) discussed lessons learned from the USFS work to develop new directives for the Forest Service groundwater programs and the groundwater resources on National Forest System (NFS) Lands. Ms. Thomas reviewed the history of collaboration in this effort with western states water resource agencies and the ongoing positive work to obtain the perspective of state water-managers in the process.



USGS Seeks National Ground-Water Monitoring Network Proposals

The U.S. Geological Survey (USGS) will award up to \$2 million in cooperative agreements to support participation in the National Ground-Water Monitoring Network (NGWMN) in 2016.

The USGS is working with the Federal Advisory Committee on Water Information's (ACWI) Subcommittee on Ground Water (SOGW) to develop and administer the NGWMN. The NGWMN is designed as a cooperative groundwater data collection, management, and reporting system that will be based on data from selected wells in existing federal, state, tribal, and local groundwater monitoring networks. The network is envisioned as a long-term collaborative partnership among federal and non-federal data providers that will help address present and future groundwater management questions facing the nation.

Cooperative agreements will provide support for both new and existing data providers in the NGWMN. The USGS will fund new data providers to select and classify sites within existing monitoring programs, to set up web services that will link the data to the NGWMN Portal, and to produce a report describing this process. Existing data providers will receive funds to maintain web services and keep site information current. Information about the cooperative agreements is available on the NGWMN Cooperative Agreements page.



Image of the NGWMN Data Portal interface. The portal provides access to groundwater data from multiple, dispersed databases in a web-based mapping application. Click the image to view the site.

Interested agencies may apply online at GRANTS.GOV under funding opportunity number G16AS00008. Applications will be accepted through January 19, 2016.

Webinars are scheduled to review the application package and answer any question about the opportunity. The next scheduled webinar is December 8th at 1 pm EST. Click this [link](#) for more information and registration.

El Niño update: Warmer-than-average waters in tropical Pacific expected to reach peak temperatures soon (NOAA, 11/12)

The peak of our current El Niño is expected to occur in the next month or so... but what does that mean? El Niño events are measured by how much warmer the surface waters in a specific region of the equatorial Pacific are, compared to their long-term average. The difference from average is known as the "anomaly," and the average anomaly is used in the Niño3.4 region (center portion of the event area) as our primary index for El Niño. When the index in this region is at its highest, we have our peak El Niño.

However, El Niño-related impacts have been occurring around the globe for months already, and will continue for several months after the warmest temperatures occur in the tropical Pacific Ocean. For example, during the 1997-98 El Niño, the Niño3.4 Index peaked at 2.33°C in November (using ERSSTv4 data, the official dataset for measuring El Niño), and the most substantial U.S. effects occurred through the early spring of 1998.

The average anomaly in the Niño3.4 region during August-October of this year was 1.7°C, second to the same period in 1997 (1).

The atmospheric response to the warmer waters is going strong. The Walker Circulation (tropical near-surface winds blowing from east to west, and upper-level winds blowing from west to east) is substantially weakened, as we expect during a strong El Niño.

In case you're unimpressed by a 2°C (3.6°F) change, let's do a little math. The area covered by the Niño3.4 region is a little more than 6 million square kilometers (2.4 million square miles). One cubic meter of water weighs 1,000 kg. So the top two meters (6.6 feet) of the Niño3.4 region contains about 12 quadrillion kilograms (about 13.6 trillion tons) of water.

The energy required to raise one kilogram of water one degree Celsius (the "specific heat") is 4.19 kilojoules. A 2°C increase in just the top two meters of the Niño3.4 region adds up to an extra 100 quadrillion kilojoules (95 quadrillion BTUs), about equal to the annual energy consumption of the U.S.!

In the U.S., the season of strongest El Niño impacts is December through March.

Las Vegas Holds Key to Abrupt Climate Change (USGS, 11/9)

According to new U.S. Geological Survey (USGS) research in the Proceedings of the National Academy of Sciences USA, springs and marshes in the desert outside Las Vegas expanded and contracted dramatically in response to past episodes of abrupt climate change, even disappearing altogether for centuries at a time when conditions became too warm. This new record, gleaned from dirt and rocks exposed in the desert just outside the city limits, provides an unprecedented look into how climate change can affect fragile desert ecosystems in the American Southwest.

Kathleen Springer, a geologist with the USGS and former Senior Curator at the San Bernardino County Museum, was the principal investigator and lead scientist for this study showing that desert wetlands are extremely sensitive to climate change.

"This is a story of water," said Springer. "Water was plentiful in the desert at times in the past, but when climate warmed, springs and wetlands dried up, and the plants and animals living in the harsh desert environment were out of luck."

During the Pleistocene, between approximately 100,000 and 10,000 years ago, wetlands dotted the landscape in the area just north of Las Vegas, attracting a plethora of ice age animals, including mammoths, sloths, sabre-toothed cats, dire wolves, and extinct species of bison, horse, and camel, and later, the first human inhab-



itants to the area.

Today, existing desert wetlands are home to a number of threatened and endangered species that rely on the ecosystem for water in an otherwise arid landscape. Their fate may lie in the hands of a rapidly changing climate.

“What we’re seeing in the geologic record frames what we are observing today,” said Springer. “The drought that California is currently experiencing is extreme, but droughts are an inherent part of the climate system and have occurred repeatedly in the past.”

The study was initiated by the Bureau of Land Management, which called for an integrative approach to studies that emphasize the geological age and context of fossils, as well as a comprehensive analysis of how local hydrologic systems responded to climate change in the past.

Link to the study products [here](#).

NASA Heads to Pacific Northwest for Field Campaign to Measure Rain and Snowfall *(NASA, 11/10)*

From Nov. 10 through Dec. 21, NASA and university scientists are taking to the field to study wet winter weather near Seattle, Washington. With weather radars, weather balloons, specialized ground instruments, and NASA’s DC-8 flying laboratory, the science team will be verifying rain and snowfall observations made by the Global Precipitation Measurement (GPM) satellite mission.

The Pacific Northwest was chosen because of its frequent and persistent winter rain and snowfall. On average 100 to 180 inches of precipitation fall a year, making it one of the few rainforests outside of the tropics in the world.

Drenching storms arrive from the Pacific Ocean, traveling over the coast and into the Olympic Mountains less than fifty miles away. Once in the mountains, the slopes act like rocks in a river, forcing the clouds in the storm system up and around and effectively changing the character of the precipitation. Following the storm system’s course from the ocean to the mountains provides the science team with a natural laboratory of highly variable terrain that leads to highly variable conditions for rainfall and snowfall – which are difficult to measure from space because they change quickly over short distances.

GPM is an international mission led by NASA and the Japan Aerospace Exploration Agency to observe rainfall and snowfall around the world. The program is managed by NASA’s Goddard Space Flight Center in Greenbelt, Maryland. The advanced instruments on the GPM Core Observatory satellite, launched Feb. 27, 2014, provide the next generation of precipitation measurements, including the new capability to detect snow and light rain.

“The GPM mission is up. We’re flying right now. We’re making measurements. So the questions are, what can we do right now and what do we have to do to improve?” said Walt Petersen, GPM’s deputy project scientist for ground validation at NASA’s Marshall

Space Flight Center in Huntsville, Alabama, who is leading the field campaign, called OLYMPEX, short for Olympic Mountain Experiment.

“We’ve designed an experiment where we have aircraft that are pretending to be the satellite,” said Bob Houze, professor of Atmospheric Science at the University of Washington and principal investigator of the campaign.

NASA’s DC-8 flying laboratory, managed by NASA’s Armstrong Research Center in Palmdale, California, will fly at an altitude of 36,000 feet above storm clouds that approach the Quinault and Chelhalis River basins on the Olympic Peninsula. In mid-November it will be joined by NASA’s ER-2 aircraft, funded by NASA’s Radar Experiment to study clouds, which will fly at 65,000 feet. Both planes will carry instruments similar to those flown in space to simulate satellite observations. At the same time, another aircraft, the University of North Dakota Citation, will be flying through the clouds taking direct measurements of the droplets and ice crystals within.

On the ground, advanced weather radars will be looking up at the clouds, studying their internal structure and how it changes as the storms move from the ocean inland. Arrays of rain gauges and other instruments on the ground will collect data on how much rainfall or snowfall reaches the surface. They will also image and count individual raindrops and snowflakes to assess on the micro-scale what heavy or light rain or snowfall looks like.



NASA’s DC-8 flying laboratory was featured as part of a special media event on Nov. 11, 2015 focused on the Olympic Mountain Experiment (OLYMPEX). Credits: NASA Photo / Carla Thomas

“This stack of measurements lets us connect the dots between what we see from space, what happens in the clouds and what we measure on the ground,” said Petersen. In addition, the detailed ground measurements help the science team understand the fundamental processes within clouds that cause different types of rain to form.

“All of these measurements are aimed at determining if the assumptions that we’re making about interpreting the satellite measurements are correct,” said Houze.

Light rain, heavy rain, snowfall – each type of precipitation has a different “signature” seen by the satellite, and those signatures change depending on the size of the precipitation droplets or ice crystals and the intensity with which they fall. The GPM satellite science team designs and uses computer programs that automatically convert those signatures into rain and snow rates and estimates of how much has fallen. Those programs involve assumptions about the nature of the raindrops and ice particles inside the clouds that are not in the observations but may affect the estimates.

The same amount of rainfall can occur due to two different sets of cloud conditions. Getting those assumptions right is important in



order to reduce inaccuracies for when those different conditions lead to different results, Houze said. And not just for the satellite measurements. The same types of assumptions are used in day-to-day weather forecasting.

For OLYMPEX, NASA is partnering with researchers at the University of Illinois, University of Utah, Texas A&M University, McGill University, Stony Brook University, Colorado State, State University of New York, Environment Canada, as well as the U.S. Forest Service, the National Science Foundation, Quinault Indian Nation and the National Park Service.

WSWC/CDWR Advancing Sub-Seasonal to Seasonal Precipitation Forecasting Workshop

The Western States Water Council, California Department of Water Resources (CDWR) and National Oceanic and Atmospheric Administration (NOAA) are holding a workshop on December 15 in Las Vegas, Nevada. The purpose of the workshop, the second in a series working toward improved seasonal precipitation forecasting, is to help water resources managers better understand current forecasting capabilities and the state of the science, as well as how to support efforts to improve future seasonal precipitation predictions in the western states. NOAA's Kevin Werner, WestFAST Vice-Chair, has worked with the WSWC and CDWR to develop the workshop. The WSWC/CDWR goal for the meeting is to help develop examples of regionally-specific opportunities for improving forecasts and associated information on economic benefits that could be used for supporting focused research efforts.

For more information on the workshop click [here](#).

Federal News

11/1: [October 2015 was warmest October on record for the globe; year to date also record warm](#)

11/3: [New Tool Rates Stream Vulnerability to Unconventional Oil and Gas Development](#)

11/4: [Acid Rain Effects on Forest Soils begin to Reverse](#)

11/5: [Removing Nitrogen from Groundwater Has New Ally: Anammox](#)

11/5: [New report finds human-caused climate change increased the severity of many extreme events in 2014](#)

11/13: [NWRA Keynote Speech](#) (Commissioner Estevan López)

11/16: [San Joaquin River Restoration Program Releases Final Environmental Documents, Provides \\$1.9 Million for Cordeniz Basin Project](#)

11/19: [Piping Plovers Losing Breeding Habitat to Wetland Drainage](#)

11/23: [Reclamation Announces Availability of the Final EIS on the Coordinated Long-term Operation of the Central Valley Project and State Water Project](#)

11/23: [Department of the Interior and New Mexico Central Arizona Project Entity Sign Agreement to Further Evaluate a Gila River Water Project](#)

11/25: [Record of Decision Signed for the Central Valley Project Municipal and Industrial Water Shortage Policy](#)

11/25: [Reclamation Releases Environmental Document for the Upper Sacramento River Anadromous Fish Habitat Restoration Project](#)

11/27: [Reclamation Releases Environmental Documents to Help Improve a Central California Irrigation System](#)

11/30: [USGS Projects Large Loss of Alaska Permafrost by 2100](#)

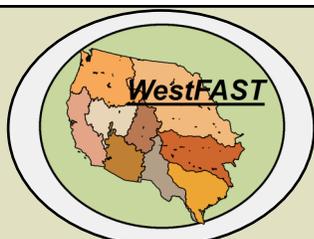
State News

11/10: [Drought Update: Drought Monitor highlights West's ongoing struggle, California prepares to capture El Nino](#)

11/24: [Western Governors offer water resource management solutions to Senate ENR committee leadership](#)

Upcoming WSWC Meetings & Events

- December, 4-5: Western Governors' Winter Meeting, Las Vegas, Nevada.
- December, 16-18: Colorado River Users Association (CRWUA) Annual Conference, Las Vegas, Nevada.



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