National Weather Service
California Nevada River Forecast Center

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HIC's Corner

Rob Hartman - Hydrologist in Charge

Thank you for taking the time to look through our newsletter. The CNRFC staff has been working hard to implement the Community Hydrologic Prediction System (CHPS) as the foundation of our river forecasting modeling system.

The adventure began in the Summer of 2006 when we joined with 3 other RFCs and NWS Headquarters staff in search of a replacement to the National Weather Service River Forecast System (NWSRFS). NWSRFS, while remarkable for its time, is dated and limiting. This Fall and Winter, the 4 CHPS Acceleration Team RFCs (CNRFC included) began operations on CHPS. The remaining 9 RFCs will follow over the next year. CHPS is based on Delft FEWS from Deltares, Inc. in The Netherlands. It's an extremely flexible system that will allow us to begin with our NWSRFS functionality and then move toward new modeling and forecasting techniques. Migrating our NWSRFS functionality into CHPS allows us to get started without recalibrating our models which would literally take years.

The transition effort had many dimensions as we had to rewire our forecasting system to allow for use of both NWSRFS and CHPS and to switch back and forth. In October we began running CHPS for our coastal watersheds and those on the east slopes of the Sierra and in Nevada. This month we'll introduce all of the California Central Valley watersheds and forecast locations. December brought a lot of precipitation and some flooding to California. The storm events gave us a great opportunity to test the new system under real-time flood operations. CHPS worked great and we're moving ahead confidently with our implementation.

The migration to CHPS will open a number of doors for the CNRFC's forecasting program. On the immediate horizon is the implementation of the Hydrologic Ensemble Forecasting System (HEFS). We've begun generating short-term ensemble-based hydrologic forecasts in an experimental mode for about 100 locations and plan to fully migrate the capability into CHPS in time for our Spring Snowmelt forecasts. Within CHPS we'll be much better able to capture the uncertainty in the 20 day forecasts as well as the appropriate execution of the hydrologic models in an ensemble mode.

Beyond HEFS, we're looking at options for better simulating stages and perhaps other parameters in the Delta and we're collaborating on a demonstration of stream temperature forecasts for the Feather River below Oroville Reservoir. CHPS really opens up the possibilities and we're looking forward to leveraging its capabilities into improved and expanded service delivery.

Inside this issue:

Russian River Collaboration Workshop Held in the Fall of 2010

Alan Haynes - Service Coordination Hydrologist
Rob Hartman - Hydrologist in Charge

The Sonoma County Water Agency (SCWA) hosted a workshop whose purpose was to begin developing a collaborative framework in support of water management activities in the Russian River Basin of California. The workshop was held in Santa Rosa at the SCWA offices on October 6th, 2010 and was initiated in response to SCWA's interest in developing a federal coalition that could help them achieve their water management and ecosystem goals while furthering the missions of each federal partner.

The Russian River had been previously identified as an ideal location for a prototype demonstration basin for the Integrated Water Resources Science and Services (IWRSS) program, which involves a consortium of Federal agencies with complementary operational missions in water science, observation, prediction and management. This consortium initially consists of the National Oceanic and Atmospheric Administration (NOAA), U.S. Army Corps of Engineers (USACE), and the U.S. Geological Survey (USGS). Other federal and non-federal water management agencies will be added as the program takes shape.

The vision of the IWRSS program is a highly collaborative and integrative framework for providing a seamless suite of water resources information across scales ranging from small hill slopes to large watersheds, from droughts to floods, and from historical analyses to long-range predictions.

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The goals of the workshop were to:

- identify short-term achievable objectives given current operational technology and resources, or "low-hanging" fruit.
- develop a framework for moving forward with improving water management in the Russian River Basin, including conducting a needs assessment, gap analysis, and a plan for acquiring needed resources.

The goals of IWRSS are:

- integrating information and simplifying access to that information.
- increasing accuracy and timeliness of water resource and forecast information.
- providing new summit-to-sea high resolution water resources information and forecasts

IWRSS is being developed, vetted, and defined at the headquarters level at NOAA, USACE, and the USGS.

IWRSS will necessarily include prototype demonstrations that are limited enough in scope and domain to be achievable. Candidate watersheds for IWRSS will cover a broad range of issues and challenges and will require identifying and prioritizing requirements. Components of prototype watersheds to consider include cooperation, funding, visibility, need, priority, and champions. Again, it was agreed that the Russian River would make an excellent prototype demonstration basin.

Going forward, a steering team comprised of one member from each agency will meet on a quarterly basis. They will be responsible for developing a collaborative vision from a watershed-wide perspective, documenting agency activities in the watershed, establishing stakeholder needs, distinguishing common ground, conducting a gap analysis, and identifying funding sources and strategies.

Overall, this workshop represents an important "baby step" in moving the IWRSS vision into action, while producing a framework to assist SCWA in overcoming their water resource management challenges in the economically and ecologically vibrant Russian River basin.

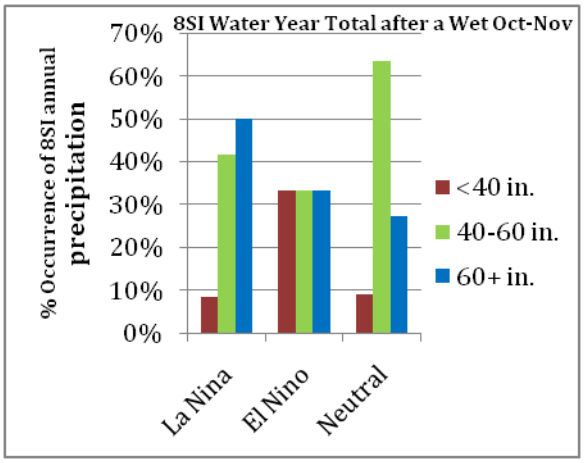
Water Year 2011 Climate Outlook - Strong La Niña

Pete Fickenscher
CNRFC Hydrologist

After a moderately strong El Niño last year (WY2010), conditions in the tropical Pacific have rapidly shifted to a strong La Niña signal. In fact, based on the Multivariate ENSO Index (MEI), the August-September MEI was the second strongest La Niña on record, the strongest signal since 1975. While Sea surface temperatures continue to fluctuate, the current La Niña will very likely affect the global climate over the rest of the 2011 Water Year.

What does this mean for regional rainfall and water supply? Already one anticipated impact has occurred. Typically, the Fall season has a better chance for above normal precipitation in Northern California during a La Niña event. As of January 1st, the 8 Station Index (8SI) is standing at 31.9 inches or 180% of normal. Even the central Sierra Nevada, as represented by the 5 Station Index is running very wet with 31.7 inches, or 246% of normal, for the first three months of the water year.

A wet start is critical in a La Niña year because on average, La Niña trends toward slightly drier than average conditions beginning in January, which has been the case so far this month. This is especially true the further south you go in California. So even though there is a tendency for being somewhat drier in late winter and springtime, a wet start typically is a good indicator that the rest of the year will be normal to above normal.



In fact, of the 12 cases where the October-November precipitation for the 8SI was in the wet tercile, only one year (1985) was below 40 inches, and the rest were all 50 inches or more (See Chart).

One other characteristic of La Niña years is that there is less variability than in El Niño years. El Niño years are usually very unpredictable in terms of Northern California rainfall. The very strong El Niño's of 1983 and 1998 would be the two exceptions as both of these events were wet for California. In other El Niño years, California can often be either very wet or very dry. Even after a wet Fall, an El Niño year could just as likely end up dry. La Niña years, by contrast, tend to center more around the norm, with less variability.

While I am hopeful this strong La Niña will bring above average precipitation for the key northern California basins, a below average year still could occur.

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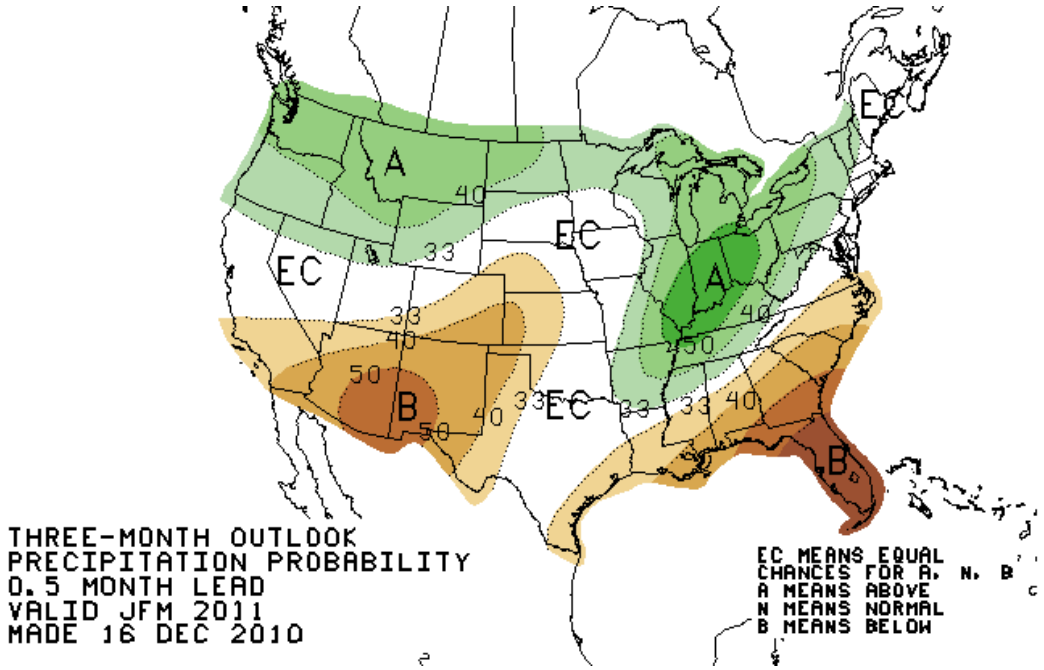

The Climate Prediction Center's latest winter forecast gives Northern California a slight chance of being wetter than normal, while Southern California has a greater chance of being dry this winter.

21st Century Extreme Precipitation Observing Network Moving Forward

Mike Anderson
California DWR State Climatologist

A collaborative effort by NOAA's Earth System Research Laboratory, the California Department of Water Resources, Scripps Institute of Oceanography and the NOAA NWS California Nevada River Forecast Center is underway to deploy and make use of new observation technology to help forecast precipitation events in California. These new observation tools include snow level radar and wind profilers.

Currently four snow level radars are deployed in this effort at Shasta Dam, Colfax, Exchequer Dam on the Merced River, and at Pine Flat Dam on the Kings River. Plans include deployment of six more at other sites in the state to facilitate establishing and tracking the freezing elevation during a storm.

In addition to the snow level radar, four wind profilers will be installed along the coast of California to provide detailed information on winds bringing moisture ashore during storm events. These profilers, combined with atmospheric water vapor sensors, can provide information on the flux of moisture that is coming ashore with the storm. Different thresholds of atmospheric moisture have been correlated to different levels of extreme precipitation events. Plans are to have these profilers online by 2013. The data from the installed new observing stations are being communicated in real time to the California Nevada River Forecast Center (CNRFC) to assist in precipitation and runoff forecasting. The freezing level data is posted on the CNRFC website and the California Data Exchange Center (CDEC).

Wind Profiler on San Nicolas Island

Flooding Hits Southern California in December 2010

Alex Tardy, WFO San Diego Warning Coordination Meteorologist
Alan Haynes, CNRFC Service Coordination Hydrologist

A very persistent wet weather pattern developed across Southern California during the middle part of December 2010, bringing heavy rainfall and associated flooding, debris flows, and landslides across portions of Southern California. The biggest impacts occurred between the 20th and 22nd of December in San Bernardino, Orange, and San Diego Counties. The combination of 10 to 20+ inches of precipitation in the San Bernardino Mountains, falling mostly as rain due to high snow levels, led to debris flows on Elder Creek and flooding on Lytle and City Creeks, as well as landslides from Highland to Loma Linda. Overall, five homes were destroyed in San Bernardino County while several bridges on Lytle Creek were seriously damaged and many roads were washed out. Snow levels did eventually lower to near 7,000 feet late Monday night into early Tuesday Dec 21st, with up to 2 feet of snow in the San Bernardino Mountains late in the storm period.

Heavy rains in the San Bernardino Mountains also caused flooding on the Mojave River flowing into the Mojave Desert, which inundated a roadway in Hesperia and resulted in motorists being rescued. Farther downstream near the town of Barstow, the high flows on the Mojave River eventually caused a levee to fail and a few homes and a roadway were flooded.

General rainfall amounts of 5 to 10 inches were observed in the coastal areas of Orange and San Diego Counties, resulting in significant flooding on the San Diego and Santa Margarita Rivers. On the Santa Margarita River, Vandegrift Road was flooded in Camp Pendleton, the Stuart Mesa Bridge closed, resulting in some base access restrictions. The river gage at Ysidora was washed out after reaching flood stage. The San Diego River crested at just over 14 feet at the Fashion Valley gage from heavy December 20-22 rainfall, the highest stage in about 30 years. Flooding on the San Diego River in the Mission Valley resulted in road closures, evacuations, and the inundation of Qualcomm Stadium with two feet of water. The heavy rainfall resulted in considerable urban and local flooding throughout Orange and San Diego counties. Many businesses were flooded in Laguna Beach, where flood depths reached four feet. Damage estimates in Orange and San Bernardino counties alone have reached 75 million dollars in each county.

Farther inland in the Coachella Valley, the normally dry Whitewater River upstream from Indio was flowing high with several feet of water, inundating and damaging golf courses and resulting in the closure of roads at low water crossings.

Precipitation for the month of December, 2010 in Southern California ran 300 to 800 percent of normal, and flooding, rescues, and other costs are estimated at over 200 million dollars.

San Diego River flooding near the Fashion Valley Mall

Car trapped in mud and debris flow in Highland, California

CNRFC Participates in HPC Visiting Forecast Exchange

Kyle Lerman, CNRFC HAS Forecaster

The HPC/RFC Visiting Forecaster Exchange Program provides an opportunity for forecasters from the Hydrometeorological Prediction Center (HPC) and River Forecast Centers (RFCs) to interact with each other and learn about each other's operational duties and concerns. HPC provides national weather forecast and analysis products for use by National Weather Service field offices as well as the general public. During the exchange, an RFC forecaster can visit HPC in Camp Springs, MD, or an HPC forecaster can visit the RFC. This past summer, the California Nevada River Forecast Center (CNRFC) participated in both aspects of the exchange by sending a forecaster to HPC and also hosting an HPC forecaster at the CNRFC.

Kyle Lerman, one of the CNRFC's Hydrometeorological Analysis and Support (HAS) forecasters, visited HPC for two days in July, where he spent time shadowing various job functions and learning different aspects of operations from HPC staff. The bulk of the time was spent with the Quantitative Precipitation Forecasting (QPF) desk, whose products are directly used in the HAS precipitation forecasting process. In addition, Kyle presented an overview to HPC staff of CNRFC operations, focusing on how the CNRFC uses HPC products in their precipitation forecasting process, and highlighting some of the local forecasting challenges in the CNRFC area. The presentation triggered discussion regarding some experimental HPC products the CNRFC might find useful.

In September, HPC forecaster Chris Hedge visited the CNRFC and spent time with the HAS unit. He received an overview of CNRFC operations and observed the precipitation forecasting process in the HAS unit. He was also given a tour of the California State Water Project operations area, which controls water moving through the California Aqueduct. Chris received a first-hand look at the Sacramento Weir and Nimbus Dam, as well as a tour of Folsom Dam in order to gain an appreciation for some of the hydrologic concerns in Northern California. Additionally, Chris gave the HAS unit a presentation on the new probabilistic QPF products HPC is issuing.

An exchange program such as this is very useful for giving staff from different parts of the agency an opportunity to meet face-to-face, and allows them to get an up-close look at other offices' operations. This type of exchange helps promote collaboration and improved services from all parties involved.

A view of the new spillway construction at Folsom Dam