National Weather Service
California Nevada River Forecast Center

Spring 2010

Volume 5, Issue 1

HIC's Corner

Rob Hartman - Hydrologist in Charge

Thank you for taking the time to look over our newsletter. As usual, CNRFC staff members are busy on a number of fronts as we move from winter operations into spring snowmelt and summer development. I'll bring you up-to-date on a couple of our initiatives.

Our migration from the National Weather Service River Forecasting System (NWSRFS) to the Community Hydrologic Prediction System (CHPS) is going well but has been more work than we anticipated. We've been running in a quasi-parallel fashion since last October and the system and configuration continues to improve. Several hurdles remain including ensemble operations and a full validation of the model results, but we're still hopeful that we'll be able to make a permanent switch by October 2010. Four of the thirteen RFCs are scheduled to begin full-time operations on CHPS this fall. The remaining nine RFCs are part way through their migration and are scheduled to switch from NWSRFS to CHPS in the fall of 2011.

Progress on the Hydrologic Ensemble Prediction System (HEFS) has slowed somewhat due to the emphasis on getting CHPS operational. Nonetheless, we're moving ahead. The value of HEFS became apparent to many during the spring floods in the Red River (North Dakota) in both 2009 and 2010 when short-term probabilistic flood forecasts would have assisted local decision makers. Recently, the City of New York began a project that will utilize and leverage output from HEFS provided by our NERFC and MARFC. This project will help us focus on getting the results we need in order to meet specific user requirements.

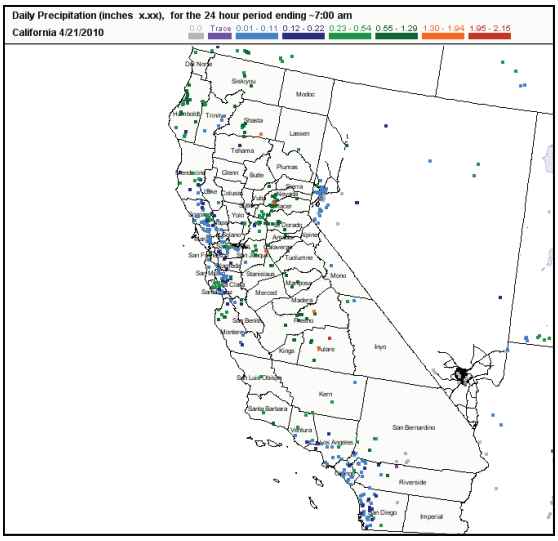
We are always interested in your comments, suggestions, and feedback. Please feel free to drop me a note any time at:

Robert.Hartman@noaa.gov

Inside this issue:

CoCoRaHS Continues to Grow in California

Dan Kozlowski - California State Coordinator



CoCoRaHS Daily Precipitation ending 7:00 am 04/21/2010

As an above-normal precipitation April comes to an end, warmer temperatures and drier conditions are on the horizon with the approaching summer months. This past winter precipitation season saw the CoCoRaHS (Community Collaborative Rain, Hail, and Snow) program add numerous new observers across the state. Currently, there are 673 volunteers across most of California's counties measuring rain, snow, and hail each day. From coastal locations to mountainous terrain, as well as valleys and deserts, the statewide precipitation map (left) shows the varying climatic regimes across our state after a widespread precipitation event.

We are always looking to fill in the gaps and continue expanding the CoCoRaHS program. From those who are simply weather enthusiasts to professionals who benefit from the data, the CoCoRaHS program would appreciate your participation as a volunteer. If you are interested in joining this growing nation-wide program, check out the CoCoRaHS website http://www.cocorahs.org for more details.

Finally, for those who already volunteer their data and time to the CoCoRaHS program, I would like to thank you for your effort. If you ever have a question, feel free to email me at Daniel.Kozlowski@noaa.gov. Also, if you have a Facebook account, a "Fan Page" has been set up for CoCoRaHS volunteers in California to post about the current weather or just to share your thoughts about the program. Search for "California CoCoRaHS" to find our "Fan Page".

A Not-So-Notable El Niño for Winter 2010

Pete Fickenscher - CNRFC Senior Hydrologist

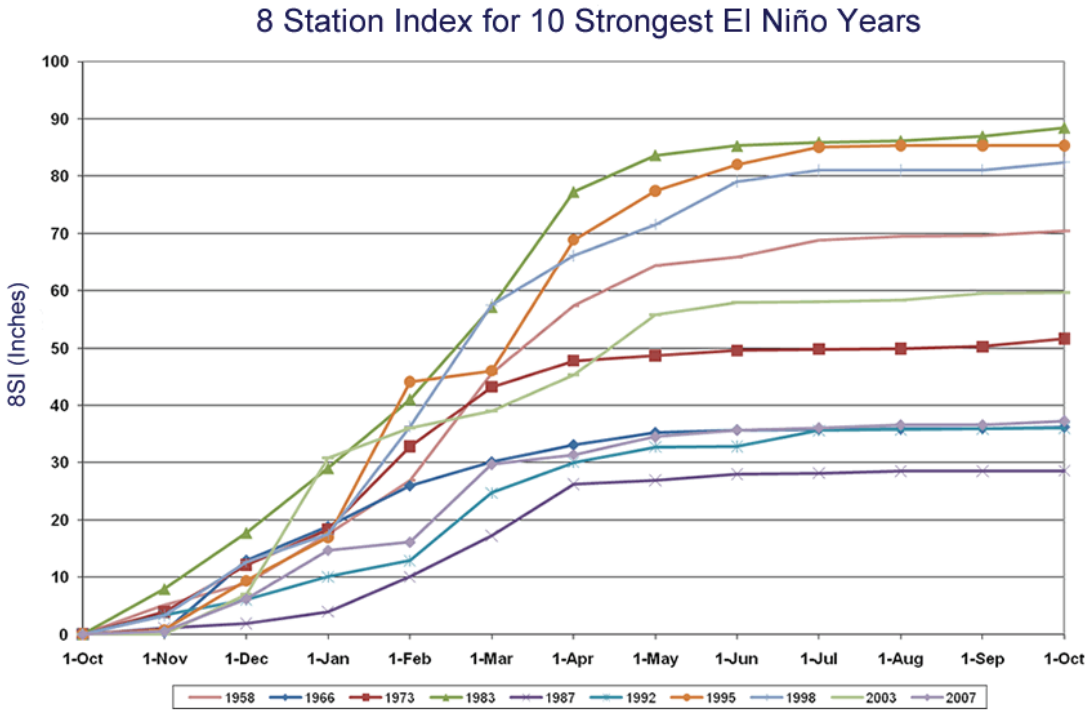
Coming into the 2010 Water Year (WY2010), much attention was given to the "moderate to strong" El Niño conditions developing in the Pacific Ocean. By November 1st 2009, the equatorial Sea Surface Tempertaure (SST) anomalies had spiked up to 1.6 ˚C, making this the warmest event since the super-El Niño of 1998. After three years of below normal rainfall throughout much of California, the hope was for a wet WY2010 El Niño to eliminate the last remnants of the extended drought. Such sentiments highlight a common misconception - that El Niño conditions equate to wet conditions for much of Northern California. In reality El Niño's are just about as likely to exacerbate a drought as they are to eliminate drought.

To evaluate the water supply conditions for California, the 8 Station Index (8SI) is relied upon heavily. The 8 Station Index tracks 8 rain gages in the mountains above the large reservoirs of Northern California (from Mt Shasta City above Shasta Dam to Pacific House above Folsom Reservoir). Since much of the water transferred to Southern California comes from these northern watersheds, the 8SI provides a good indication of the water supply for all of California. The rough average for the 8 Station Index over its period of record (1922 to present) is 50 inches.

Looking at the 10 strongest El Niño's (prior to this past year), we see how variable El Niño years can be in Northern California (see Figure 1 below). While four El Niños were very wet (over 70 inches on the 8SI), four El Niño years were very dry (under 40 inches on the 8SI). Only one year (1973) came close to the average 8SI of 50 inches. Taking the average of the 10 selected years, moderate and strong El Niño years are indeed wetter than average (57.6 inches compared to 50 inches). But in terms of frequency of occurrence, five El Niño years were very wet, but four years were very dry, including 2007, the start of the 2007-2009 drought.

These statistics show that the impression that El Niño years are wet years is a dramatic oversimplification. Every El Niño year develops differently, and there can be little confidence as to which direction it will go. The one caveat to this statement may be in reference to "super" El Niños, which occurred in WY1983 and WY1998, where conditions were far beyond even other "strong" El Niños.

As for WY 2010, we seem to be heading for only the second "normal" season for Northern California during a moderate or strong El Niño . Currently (as of May 11th), the 8SI is at 50.0 inches, which is 108% of seasonal average to date. All indications are that the 8SI will likely end up in the low 50's for WY2010. So despite all the variability that El Niños tend to bring to California, this year has been relatively "normal".



La Cañada Flintridge, CA Neighborhood Severely Impacted by Debris Flow from the Station Burn on the Morning of February 6, 2010

Eric Boldt, WCM, Jayme Laber, SSH, and Jamie Meier, Intern - WFO Los Angeles/Oxnard

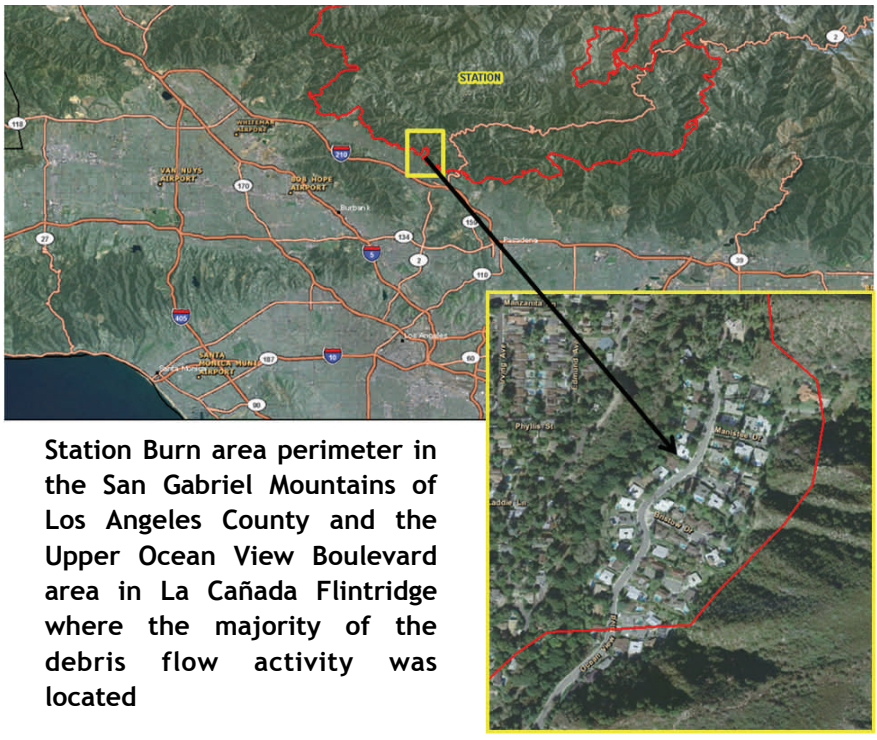
A rather narrow frontal band approached Southern California early on Thursday, February 4, and moved into the area late Thursday night (February 4) and early Friday (February 5) with a period of steady light to moderate precipitation.

The moist plume (with precipitable water >1.0 inch) remained over the area overnight while the secondary front and cold pool dropped down the central coast of California. Heavy rainfall was expected to, and ultimately did, develop along the front and impacted eastern Los Angeles County between midnight and 8 a.m. Saturday (February 6). A heavy band of slow moving thunderstorms formed around 3 a.m. and pushed across Malibu and the West Hollywood area, creating several mud and rockslides before moving across the Station burn area. Between 4 a.m. and 5:30 a.m. Saturday morning, several severe debris flows occurred along the urban interface of La Cañada Flintridge and La Crescenta-Montrose (Figure 1). These debris flows deposited several feet of mud over the urban interface of the burn area, and severely damaged up to 43 homes and 25 vehicles between 4 a.m. to 5:30 a.m. Saturday. Despite ample lead time with the event, no evacuations were made before the heavy rains.

"Despite ample lead time with the event, no evacuations were made before the heavy rains. Fortunately, no one was injured or killed."

Fortunately, no one was injured or killed. K-rails and cars were strewn about and debris basins were either filled completely or overtopped during the event. Several homes were filled with mud to nearly countertop level and furniture was washed out into yards and streets (Figure 2). Reverse 9-1-1 calls were made to residents of La Cañada Flintridge for mandatory evacuations around 9:30 a.m. Saturday morning, well after the destructive debris flows had occurred. Significant debris flows were also reported in the Morris Burn area (just east of the Station burn area) during post-storm surveys by staff from the United States Geological Survey (USGS), but no activity was observed at the one year old Santa Anita Burn area (also just east of the Station burn area).

Colder, unsettled air followed the front with scattered moderate to heavy showers continuing through Saturday afternoon. Flash flood warnings were extended throughout the day for the Station and Morris Burn areas due to excessive runoff and overtopping debris basins from the additional rainfall.



Station Burn area perimeter in the San Gabriel Mountains of Los Angeles County and the Upper Ocean View Boulevard area in La Cañada Flintridge where the majority of the debris flow activity was located

Figure 1 (left) - The perimeter of the Station Fire is outlined in red. The inset area highlighted in yellow is the area damaged by debris flow. The Station Fire started in the Angeles National Forest August 26, 2009, and burned over 160,000 acres. It was not declared fully contained until October 16th.

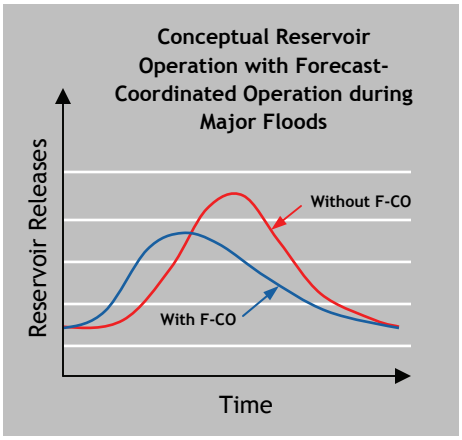
Figure 2 (above) - Photo showing a residence partially buried by debris flows from heavy rains that occurred on February 6, 2010.

Progress Continues on the Expansion of the Forecast Coordinated Operations Project

Alan Haynes, CNRFC Service Coordination Hydrologist and Boone Lek, Chief, Reservoir Coordinated Operations, CADWR

The Forecast-Coordinated Operations (F-CO) Program began in the Yuba-Feather river system as an interagency endeavor to improve the joint ability to keep flood discharges below designed capacities downstream of the Yuba-Feather confluence during major runoff events. The goal of the F-CO program is to improve flood protection and better life and property for communities downstream of reservoirs without impacting the water supply of these same reservoirs. The project involves collaboration and coordination between agencies, using a common reservoir simulation model as the primary tool to facilitate coordination. The agencies involved in this pilot project include NOAA, the California Department of Water Resources (DWR), the U.S. Army Corps of Engineers and the reservoir operators. In the pilot project on the Yuba-Feather basin, the reservoir operators are the Yuba County Water Agency and DWR's Division of Operations and Maintenance. In October 2009, the second annual functional exercise was successfully conducted to test communications and software systems functionality associated with the Yuba-Feather F-CO project.

Recently the F-CO consortium has been working with various San Joaquin River system reservoir operators, including the Merced Irrigation District, the Bureau of Reclamation, and the Kings River water authorities. The major reservoirs associated with these agencies include Lake McClure, Millerton Lake and Pine Flat. The ability to coordinate releases into the San Joaquin system during major runoff events would be extremely beneficial, due to the relatively low capacity of the San Joaquin River flood control system and slow travel times.



The scoping process associated with expanding F-CO into the San Joaquin involves working with the various agencies responsible for managing the water, establishing agreements on how they will operate during high flows, and identifying gaps in the current observing systems. This process has potential ancillary benefits for routine river forecasting operations, both through strengthening relationships among partners involved in water resources management and in finding ways to improve forecasts through enhancing the observation network.

Regarding the observation network, some of the recommendations so far are to add sensors to several established sites, install instrumentation at new sites, and add telemetry to some existing sites. A recommendation was also made to locate one of the new vertically pointing radars that measure the melt level of falling precipitation at New Exchequer Dam. The state of California has contracted to purchase a network of these instruments throughout California (see article below). These radars will allow hydrologists to more accurately determine basin runoff through real-time snow level information.

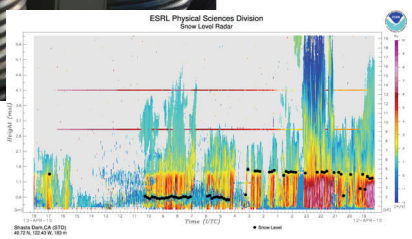
The F-CO concept is part of a growing trend to better integrate and leverage expertise among various agencies responsible for flood forecasting, flood protection and managing water resources. F-CO is undergoing an evolutionary process that will involve both its expansion into new watersheds and the refinement of its associated tools as users gain experience.

California Dept. of Water Resources Brings New Snow Level Radars to Northern California

Michael Anderson - State Climatologist, CADWR

California is currently investing in improvements to its Flood Emergency Response and Planning capabilities. As part of this investment, the CA Dept. of Water Resources is teaming up with the National Oceanographic and Atmospheric Administration's Earth System Research Laboratory and the National Weather Service to bring snow level radar to the Central Valley. Currently two sites are installed and operating: Shasta Dam and Colfax with pictures of the Shasta Dam site installation and sample data also shown on the right. Over the next four years, eight more snow level radar installations will be made. This data will help forecasters initialize their models to improve runoff forecasts. Over time, the data also can be used to determine any changes to the freezing level as climate changes.

(Left) - Snow Level Radar installation near Shasta Dam



(Right) - Data plot from the Shasta Dam Snow Level Radar showing snow levels lowering during an April 12-13 storm

River Gage House and Information Kiosk Opens in Yosemite

Steve Mendenhall, Meteorologist in Charge, WFO San Joaquin Valley - Hanford

This spring a new gage house and information kiosk (Figure 1) featuring water and weather information was completed at Happy Isles on the Merced River in Yosemite National Park. The project is a cooperative effort between the National Park Service (NPS), the United States Geological Survey (USGS), and the National Weather Service (NWS).

Figure 1 - Happy Isles River Gage House and Information Kiosk in Yosemite National Park

The structure is on the floor of Yosemite Valley, along the western bank of the Merced River (Figure 2). Visible to public is the state-of-the-art stream gage, which became operational last March. This gage is the latest equipment to take river stage and flow rate readings at Happy Isles, which date back to 1916. "The long history of hydrologic data has a great importance in determining changes in the watershed and serves as a backdrop for other potential changes within the Sierra Nevada," said Clint Nagel, Field Office Chief (ret.) with the USGS Sacramento Water Resources Division. Data are telemetered via satellite every hour. The USGS also installed a live webcam on the roof of the building to visually monitor conditions upstream and downstream of the gage. "More accurate instrumentation, better interpretive displays, and hopefully a more secure and safe installation are all benefits of the new gage relocation," said Nagel.

Mounted on the roof of the kiosk is meteorological equipment owned by the NWS' San Joaquin Valley Weather Forecast Office in Hanford. "These readings will complement a network of observations in and around Yosemite National Park," said Steve Mendenhall, Meteorologist in Charge of the forecast office. "Observations at Happy Isles will improve our ability to monitor changing river and weather conditions, which could result in life-saving warnings for the park."

Flat-screen monitors viewable through windows in the kiosk continuously update with the latest observations and forecasts of river and weather conditions for Yosemite Valley. Visitors can also hear the current NOAA All-Hazards Weather Radio broadcast tailored to Yosemite National Park.

"The interpretive exhibits on the new state-of-the-art gage house are the first in the park dedicated to informing visitors about the importance of water science," said Park Hydrologist Jim Roche. "Water resources are central to most visitors' Yosemite experience and the new gage and exhibits in a beautiful river setting amplify this."

Figure 2 - Scenic view of Yosemite Valley from near the River Gage House and Information Kiosk, located along the western bank of the Merced River

Winter 2009-2010 Precipitation Recap

Kyle Lerman - CNRFC HAS Forecaster

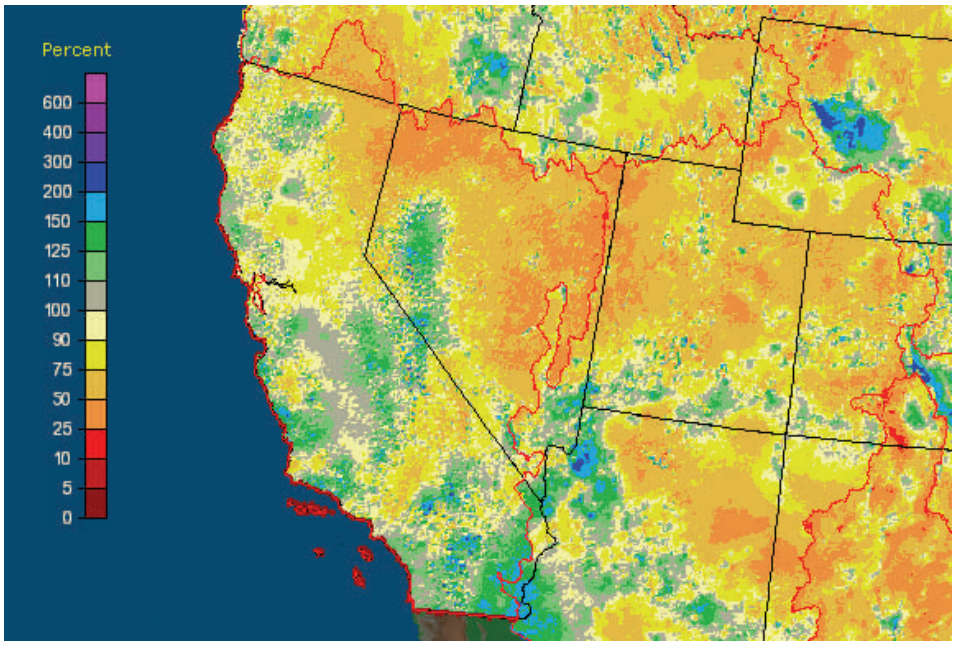
As the winter of 2009-2010 began in the midst of a strengthening El Niño, there was considerable speculation on how the precipitation pattern on the west coast would unfold. Long-range outlooks called for above-average precipitation in southern and central CA as well as southern NV, with an equal chance of above- or below-average precipitation in northern CA and northern and central NV. As the wet season winds down, let's take a look at how this winter's precipitation actually shaped up across California and Nevada.

The graphic on the right shows the percent of normal precipitation since the beginning of the water year (starting October 1). Much of northern California, including the northern Sierra Nevada Mountains, were below normal except for the Lake Shasta area and parts of the coast from Cape Mendocino southward, which were slightly above average. The southern half of CA fared better, with parts of the central CA coast and the southern Sierra Nevada finishing up at least 125% of normal. Parts of far southern CA were well above normal and approached the 200% of average mark. In Nevada, most of the state ended up below normal while areas in the western part of the state showed up as above normal, mainly due to heavy precipitation in October 2009. Overall, the observed rainfall pattern for the winter season matched the predictions from the Climate Prediction Center (CPC) from back in October reasonably well. One interesting note is that although much of northern CA received below average precipitation overall, there were enough "cold" storms (particularly a stretch in mid-January) to provide a well above-average snowpack for the season (175% of normal as of April 28). The central and southern portions of the state also recorded an above-average snowpack for the season.

Two of the storm events this past winter stood out as being the most significant. The first occurred on October 13-14, just 2 weeks into the new water year, when widespread heavy precipitation pounded CA and western NV. This powerful storm only affected the region for about 24 hours, but both the northern and central Sierras received more precipitation than an average entire month of October in this brief period. The city of Sacramento in the central valley of CA picked up 3 times the monthly October average on October 13th alone, and a few locations on the central CA coast received in excess of 10 inches in 24 hours. Despite the extreme intensity of the precipitation, the early-season nature of the storm precluded any significant widespread flooding problems due to the dry antecedent soil conditions. A thorough write-up of this storm can be found on our web site at the following address:

http://www.cnrfc.noaa.gov/storm_summaries/oct2009storm.php

The second significant storm event of the winter was a series of systems that blasted across the region from January 17-22. Although precipitation intensity was much lower than during the October event, multi-day accumulated precipitation totals were high. Around 10 inches were reported at some stations on the central CA coast and northern Sierra Nevada Mountains with over 20 inches reported at a favored location near the Shasta basin. Amounts were not quite as impressive in southern CA, but several inches were still reported in the southern Sierras and the southern CA coastal mountains. This storm was cold enough to contribute significantly to California's snowpack, especially in the northern portion of the state. Due to the colder nature of the storm (meaning less runoff) and the breaks between the storms, widespread hydrologic impacts were minimized during this January event as well.



Water Year 2010 Percent of Normal Precipitation as of May 3, 2010

As a side note, this year's El Niño turned out to be classified as "strong" according to CPC. A strong El Niño means that eastern Pacific sea-surface temperature (SST) anomalies reach at least +1.5°C over a 3-month average, and the current El Niño peaked at +1.8°C during the November-January period. That makes this year the strongest El Niño since the very strong 1997-1998 event, and this year was also tied for the 4th strongest El Niño on record since the SST dataset began in 1950.

2010 Precipitation and Water Supply Conditions

Scott Staggs - CNRFC Senior Hydrologist

Water supply conditions this spring for river basins in the CNRFC forecast area are generally much better than this time last year. Most basins received near normal to above normal precipitation since October 1. Much of the precipitation fell as snow, so the snow pack conditions are also near to above normal.

River basins in the Upper Sacramento and Trinity drainages, and southern Sierra Nevada benefited the most from this year's precipitation with above normal precipitation and snowpack conditions. Other basins on the west and east slopes of the Sierra Nevada have near normal conditions. In contrast, the Upper Klamath basin in Oregon and Upper Humboldt basin in eastern Nevada did not fare as well this past season. Seasonal precipitation for these basins range from slightly below normal in the Upper Humboldt to below normal for the Upper Klamath.

Water supply forecasts this spring are also generally better than this time last year (Figure 1). Water supply forecasts for most basins are near normal to above normal. The exceptions are again in the Upper Klamath and Upper Humboldt River basins where forecasts indicate below normal runoff. On the positive side, basins in the southern Sierra Nevada are forecast to have above normal runoff.

There is adequate reservoir storage capacity due to the previous dry year, so most of this spring's snowmelt runoff will be captured and stored. Many reservoirs are expected to fill to capacity and most reservoirs are expected to store more water this summer than last year.

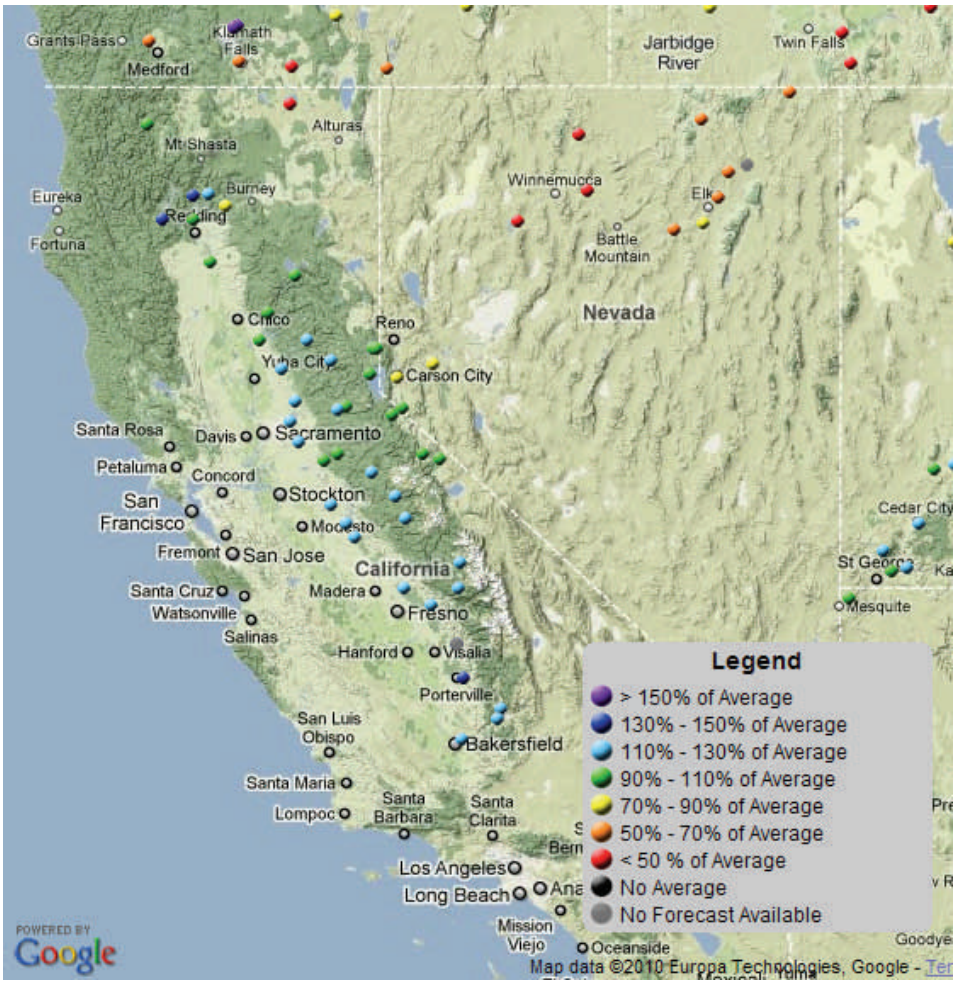


Figure 1. Water Supply Forecasts issued May 1, 2010

For more information on Water Supply Forecasts throughout the West, visit http://www.nwrfc.noaa.gov/westernwater/