National Weather Service
California Nevada River Forecast Center

Spring 2009 Newsletter

Volume 4, Issue 1

HIC's Corner

By Rob Hartman
Hydrologist in Charge

Here's a question for you… How many federal government agencies are involved in the provision of services associated with water resources? More than just a few, right? And to what degree do you suppose that the activities of these federal agencies are well coordinated? Is there duplication of effort? Is information effectively shared and leveraged? I believe that the U.S. tax payer expects and deserves a higher degree of collaboration than has historically taken place. But alas, there is hope…

While federal water management agencies do share information, we've never been all that good at developing architectures that make information exchange "effortless." Over the past 18 months, NOAA, the U.S. Army Corps of Engineers (USACE), and the USGS have been working toward a vision of the Integrated Water Resources Science and Service (IWRSS). Clearly, there are many agencies that need to be involved in this effort, however, you need to start small and build toward something more comprehensive.

The vision of IWRSS is to create true "interoperability" between the operational activities of the federal water management agencies. Interoperability means more than exchanging information; it means that when one agency has the information, the others do as well. It infers a form of database to database connectivity that eliminates the need to become aware of new information and the steps (e.g. ftp or transmission) required to gather or disseminate it. For example, NOAA currently downloads and processes USGS rating curve updates from a central USGS server. Under IWRSS, when a rating curve is updated, NOAA would automatically have it. Other examples include information related to levees as well as observational and forecast data.

IWRSS also focuses and coordinates scientific development with direct operational application. The sharing of research and of research to operations efforts within the IWRSS umbrella should help us bridge gaps in our scientific understanding and operational applications.

IWRSS is facilitated by NOAA and USACE efforts to migrate their operational systems to CHPS (Community Hydrologic Prediction System) and the CWMS (Corps Water Management System) respectively. Similar efforts are underway at the USGS. As we move forward, gain experience, and demonstrate success, IWRSS will add agencies and expand in its capabilities and value. For additional information on IWRSS please see http://www.westgov.org/wswc/cline.pdf. If you have questions or comments on IWRSS or any program related to the CNRFC, please feel free to give me a call or send me a note.

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CNRFC's New Forecast Architecture

By Rob Hartman

Currently, the CNRFC staff is migrating our forecasting architecture from the NWS River Forecast System (NWSRFS) to CHPS (see fall 2008 newsletter for details). It's a complicated process, but the payoff will be tremendous in the years to come. We view this as an opportunity to clean up our data definitions as we move, kind of like a combined spring cleaning and garage sale. Our plans are to have CHPS ready to go for parallel operations with NWSRFS by October 2009. We'll then test and evaluate the new system over the winter and spring to make sure it performs as expected before setting NWSRFS aside.

Inside this issue:

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Drought Monitoring: Percent of Normal vs. Percentiles

By Pete Fickenscher

Sometimes one word or phrase can convey a whole new perspective. This is certainly true in the area of drought monitoring. As we come to the end of the wet season for WY2009, drought has been on everyone's mind. The CNRFC has been working to help monitor the current drought through a few new products posted on our website (look under the Climate Tracker section of http://www.cnrfc.noaa.gov/climate.php).

Understanding these products requires a small but significant shift in the common vocabulary of climate statistics. In most newspapers, the annual precipitation for a location is reported with respect to the mean or average. Often the word "normal" is used, which really is a misnomer since climate is always changing and "normal" is simply an average over an arbitrary time period.

Using the "percent of normal" presents a problem when trying to evaluate drought. How low a percent of normal would indicate a drought? Is 80% of normal a drought? 60%? Then there is also the question of what time scales (i.e., rainfall over the past year? two years? three years?).

> Recent runoff has been much closer to normal, though not enough to make up for large deficits in large reservoirs like Shasta and Oroville.

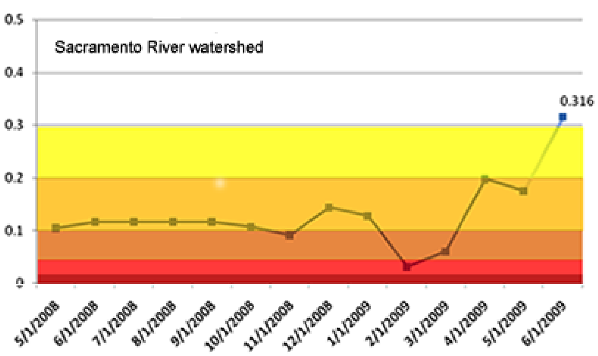
The U.S. Drought Monitor has provided us with a helpful matrix for evaluating the severity of drought, one that is based on percentiles. Percentiles range from 0 to 1.0 and are based on frequency of occurrence. For example, the 10th driest year out of 100 years of record would be the 0.10 percentile. The median of any data set would be the 0.50 percentile. The Drought Monitor assigns different levels of drought severity based on many factors, including the percentile of the accumulated rainfall over different time scales (see http://drought.unl.edu/dm/classify.htm).

The CNRFC has been producing weekly updates over the past wet season to evaluate drought severity in two critical regions. Over 70% of California's reservoir storage is located in the Sacramento and San Joaquin watersheds. The California Dept. of Water Resources maintains two precipitation indices, the 8-Station Index (8SI) for the Sacramento River watershed, and the 5-Station Index (5SI) for the San Joaquin River watershed. By monitoring the percentiles of these two rainfall indices based on a long period of records, we can get an indication of whether the drought is worsening or improving.

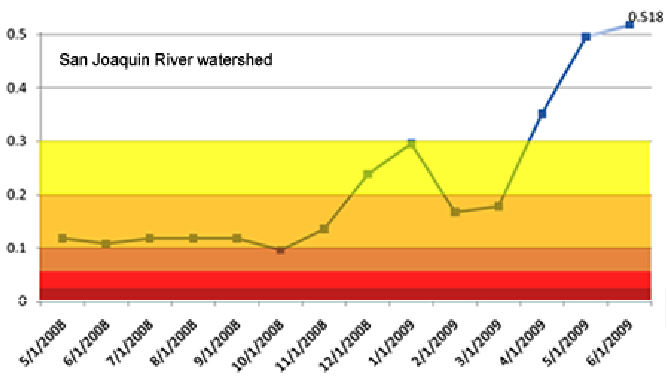
The left graph below, showing the progression of the 24-month percentiles of the 8 Station Index (8SI), gives a quick picture of the drought in the Sacramento River watershed. The right graph shows a plot of the 5SI for the San Joaquin River watershed.

At the beginning of the water year, the 8SI percentile stood at about 0.10, or a once in 10-year event. The dry first half of the wet season (Oct-Jan) led to tremendous drought concerns by early February when the 8SI percentile dropped to 0.03, or a once in 30 year event. But the last four months of above normal precipitation have caused the 8SI percentile to climb to 0.32 by early June. Recent runoff has been much closer to normal, though not enough to make up for large deficits in large reservoirs like Shasta and Oroville.

Drought can be a very subjective term; but hopefully by looking at percentiles we can add some objectivity to the process.



8SI Percentile: Progression of Past 24-months (weighted)



5SI Percentile: Progression of Past 24-months (weighted)

CoCoRaHS - California The First Six Months

By Michael Anderson
State Climatologist
CA Dept. of Water Resources

As we enter the summer of 2009, it is a good time to look back on the first six months of California's CoCoRaHS endeavor. CoCoRaHS – the Community Collaborative Rain Hail and Snow network is a volunteer observing network whose members record their precipitation measurements from a 4" rain gage online. This network of volunteer weather enthusiasts now spans 43 states and includes over 12,000 members. In California, currently there are 508 volunteers in 48 counties. Ten counties have one volunteer and ten counties have zero volunteers. The top five counties are:

Sonoma	80
San Diego	34
Nevada	28
Shasta	27
Santa Clara	26

California's regional coordinators have excelled in getting the word out about CoCoRaHS, providing training classes, and working to make this volunteer observer network thrive. Thanks to the regional coordinators for their efforts to make California's CoCoRaHS network one of the top states in the network.

California's volunteers have done a great job reporting their precipitation totals. As of May 19, 2009, 41,734 reports have been entered which corresponds to an average of 180 reports per day. Over two hundred reports per day were entered during February's rains and over one hundred reports have been entered in May when rainfall activity was limited to scattered thunderstorms. The maximum number of reports entered for one day was on April 8, 2009 when 312 reports were entered. As for snow, 483 reports of snow greater than zero have been entered with a maximum of 28 reports recorded on February 13, 2009.

The largest rainfall total entered so far is 5.58 inches recorded on February 16th in Santa Cruz County. There were actually two reports from Santa Cruz County that day that topped 5 inches. At the other end of the spectrum are the zero precipitation entries. Zeros are an important component of rainfall records and many of the volunteers are making the effort to get that data into the database as well. As for snow reports, the greatest new snow depth reported was 41 inches in Placer County on March 4th.

Looking ahead, we hope that California can register at least one volunteer in every county in the coming year. More volunteers mean more data which helps to define the amazing diversity of precipitation patterns in California. This data has a multitude of uses from climate to flood and drought operations. If you are interested in finding out more about CoCoRaHS, please visit the web page at http://www.CoCoRaHS.org.

Service Coordination Hydrologist Selected for the CNRFC

By Alan Haynes

The California Nevada River Forecast Center (CNRFC) selected Alan Haynes as the Service Coordination Hydrologist in November 2008. Alan's previous positions in the National Weather Service (NWS) included eight years as a Hydrometeorological Analysis and Support (HAS) Forecaster for the CNRFC and ten years as a meteorologist in two NWS Weather Forecast Offices. The NWS recently created the Service Coordination Hydrologist (SCH) position to be filled at each of its 13 River Forecast Centers (RFCs). To date, the SCH slot has been filled in all RFCs with the exception of the Ohio Basin River Forecast Center.

The purpose of the SCH is primarily to strengthen the outreach and service coordination activities of the RFC. However, the position also serves to bolster the management staff of the RFC and to create a broader career ladder for hydrologists in the NWS.

Over the past decade the hydrologic services of the NWS have grown in sophistication while the need for these services has gained in importance due to the increasing pressures on the management of water resources. Meanwhile, floods continue to be the number one weather -related cause of fatalities in the United States.

In order to maximize the effectiveness of NWS hydrologic expertise, people need to be aware of the services that the NWS provides and to understand how to use them. For example, the NWS is developing its ability to quantify the uncertainty in its hydrologic forecasts. Interpreting this information is not a trivial matter and the SCH will be invaluable in this role. It is equally important for the NWS to gather feedback from its customers and partners affected by hydrologic issues.

Basically, the SCH will serve as the interface between the NWS's hydrologic services and the customers and partners who rely on them.

2009 Water Supply Outlook

By Scott Staggs

Overall, the water supply forecast for the California-Nevada River Forecast Center (CNRFC) area is better than last year, despite below average seasonal precipitation for the third year in a row. Water supply conditions for river basins on the west slope of the Sierra are better than last year. Rainfall in early May helped increase reservoir storage in many basins, especially on the west slope, in the northern and central Sierra. Water supply conditions on the Upper Klamath River, the east slope of the Sierra, and in Nevada are about the same, to slightly better than last year. Many of these basins did not benefit from early May rainfall.

Current storage at many of the major water supply reservoirs in California, on the west slope of the Sierra, is better than this time last year. Current storage values range from 98% of capacity at Millerton Lake on the San Joaquin River, to 65% of capacity at Lake Oroville on the Feather River. Last year, at this time, Millerton Lake was at 72% of capacity, and Lake Oroville was at 50% of capacity.

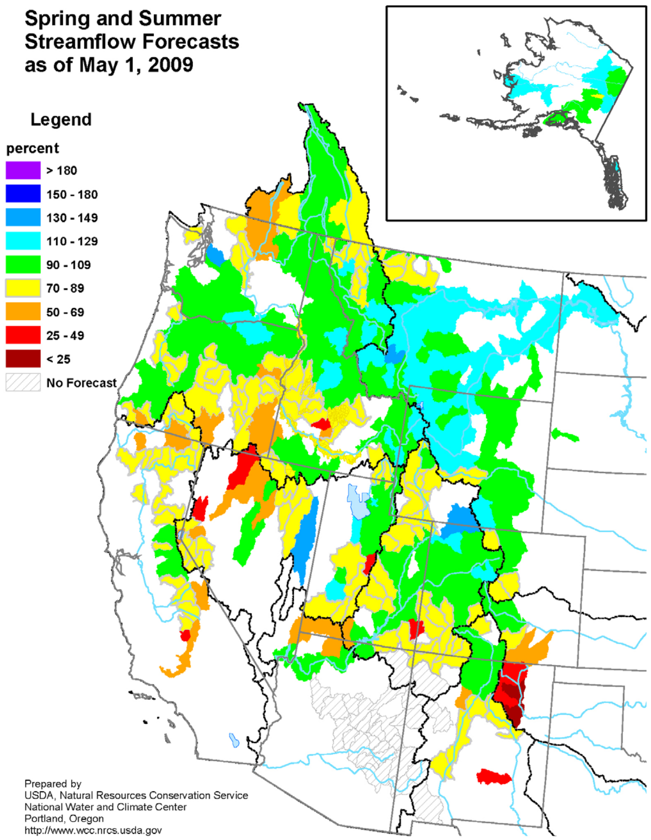
Water supply forecasts for river basins on the west slope of the Sierra, in California, are generally better than last year. Forecasts range from 95% of normal at New Melones Reservoir on the Stanislaus River to 78% of normal at Pine Flat Reservoir on the Kings River. The Kern River is the only major river basin in California with a water supply forecast that is less than last year.

On the east slope of the Sierra and in Nevada, current reservoir storage is generally less than last year due to a third year of below-average seasonal precipitation. Stampede Reservoir on the Little Truckee is only at 50% of capacity. Last year, at this time, Stampede was at 65% of capacity. Lake Tahoe's lake level is down about 1 foot from this time last year, with storage at 23% capacity. Last year, Lake Tahoe was at 38% capacity. Currently, Lake Tahoe is 1.5 feet above its natural rim. Lake Tahoe could fall below its natural rim late this summer due to releases into the Truckee River and evaporation from the lake's surface. Outflow from the lake into the Truckee River would temporarily cease until the lake level rises again with next winter's precipitation.

The water supply forecast for the Upper Klamath, east slope of the Sierra, and in Nevada is overall slightly better than last year. Water supply forecasts range from 80% of normal on the Klamath Lake inflow and East Carson River, to 68% of normal on the Humboldt at Palisade. In summary, reservoir storage and overall water supply conditions for the CNRFC forecast area are better than last year, but still below normal. Most regions will not experience any significant water shortages, but there will be reductions in water allotments in many areas. Please see the "Western Water Supply Forecasts" website at: www.nwrfc.noaa.gov/westernwater/ for a complete summary of water supply conditions for the western United States.

> *"In summary, reservoir storage and overall water supply conditions for the CNRFC forecast area are better than last year, but still below normal.."*

Thunderstorm in the Sierra Nevada above Folsom Lake in early May 2009



Climate Change: What We Know and What Are the Potential Impacts on California & Nevada

By Dan Kozlowski

As the 21st Century progresses, the issue of climate change has become more in the forefront of our everyday lives. Scientific data continues to point to the fact that the global surface temperatures are warming, and that this is a direct result of the increasing concentration of greenhouse gases in the atmosphere. Given this information, the obvious question becomes, “What potential impact does this have on the region?”

In order to discuss climate change, one must first understand the greenhouse effect, and how it affects our climate. The greenhouse effect acts to control the temperature of Earth through the process of absorbing heat by certain gases in the atmosphere, and re-radiating a portion of this energy back toward the Earth’s surface. Two of the primary greenhouse gases are water vapor and carbon dioxide. Without this natural process, the average surface temperature of Earth would drop from its current 57°F to 0°F.

The second most abundant greenhouse gas (carbon dioxide) has been increasing at an alarming rate since the Industrial Revolution. This is primarily due to the human activity of burning fossil fuels. This can be proven through the measured decrease in the ratio of carbon-13 to carbon-12 in the atmosphere. The ratio of carbon-13 to carbon-12 in atmospheric carbon dioxide is larger than the ratio in fossil fuels. If atmospheric carbon dioxide is increasing due to burning fossil fuels, then the ratio of carbon-13 to carbon- 12 would decrease, and that is what is indeed occurring.

Statistics show that the global surface temperature has increased about 0.74°C (plus or minus 0.18°C) since the late 19th century, and the linear trend for the past 50 years of 0.13°C (plus or minus 0.03°C) per decade is nearly twice that for the past 100 years. Although the global temperature has warmed, it has not been uniform. Recent warming has been greatest over North America and Eurasia across the higher latitudes.

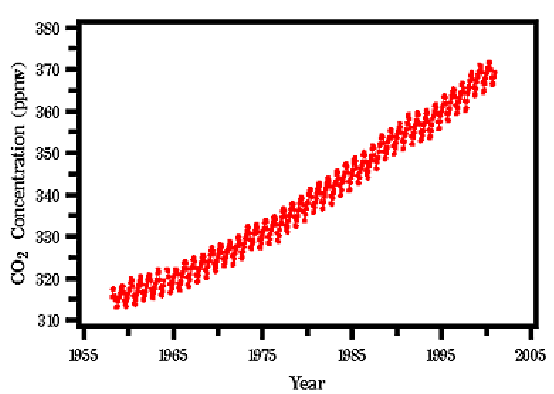
With acceptance that climate change is occurring, the question still remains, “What potential impact does this have on the region?” Two of the most important topics discussed across the western United States are drought/water supply and wildfire risks. As a result of the rising temperatures, snow cover across the northern hemisphere has been decreasing. Also, snowmelt-related stream flows are occurring earlier than previously recorded. Overall, the trend of more rainfall and less snowfall during storm systems appears likely. The effect on wildfire season appears to be an increase in the length of the fire season and an increase in the severity of the burns. Observed changes so far pointing to this conclusion include: reduced nighttime recovery in relative humidity across the West and an increase in tree mortality rate due to diseases.

Climate change is a complex phenomenon and as the underlying processes become better understood, NOAA and the National Weather Service will continue to educate people on the projected impacts of these developments.

For a list of frequently asked questions, please visit:

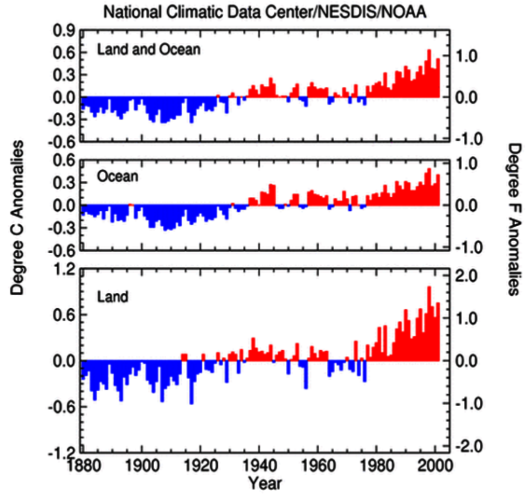
http://www.ncdc.noaa.gov/oa/climate/globalwarming.html

Carbon dioxide concentration as measured at Mauna Loa, Hawaii. These measurements represent the globally mixed concentration.



Source: Dave Keeling and Tim Whorf (Scripps Institution of Oceanography)

Jan - Dec Global Surface Mean Temp Anomalies

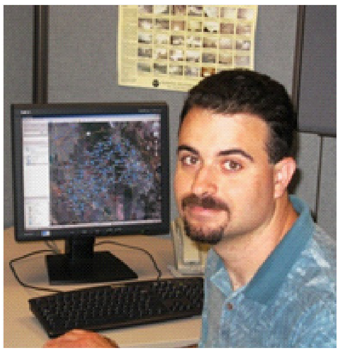


New Meteorologist Joins CNRFC Staff

By Alan Haynes

The latest addition to the California Nevada River Forecast Center (CNRFC) staff is Kyle Lerman. Kyle fills a vacant Hydrometeorological Analysis and Support Forecaster (HAS Forecaster) slot, one of three meteorologist positions at the CNRFC. He is also the first new forecaster hired at the CNRFC in over eight years.

Kyle graduated from San Jose State University with a B.S. Degree in Meteorology and has worked at two National Weather Service Forecast Ofices (WFOs), most recently at the Eureka WFO, before coming to the CNRFC. His experience and interests have centered on local modeling efforts, webmaster activities, and managing the Weather Event Simulator, a system used to train meteorologists using past-based weather events of meteorological significance.



Kyle Lerman

Kyle is originally from the Sacramento area and has weather forecasting experience in California. His knowledge of California weather and his talents working with science-related technology make him well suited for strengthening the CNRFC team.

Help us warmly welcome Kyle to the CNRFC!

CNRFC Adopting New Text Bulletin Format

By Alan Haynes

The California Nevada River Forecast Center (CNRFC) is adopting a new format for its text based river forecasts, known as “RVFs”. With the advent of the Graphical River Forecast, or “Graphical RVF”, and its availability on the CNRFC webpage, most users no longer use the text-based forecast product. However, the text product also contains a portion that is encodes the river forecast in “SHEF”, or “Standard Hydrometeorological Exchange Format”. This coding is used by a software package to ingest and manipulate the forecasts produced by the CNRFC at the National Weather Service Weather Forecast Offices (NWS WFOs), from which river flood warnings are ultimately issued.

The primary attributes of the new format that differentiate it from the old format are:

- bullet format
- an hourly ordinate
- extends to 120 hours
- issued with every forecast cycle

The advantages of the new format are that it gives the WFOs more flexibility in issuing flood-related watches and warnings and that it facilitates a timelier issuance from the CNRFC due to less post processing. Another significant advantage is that it will ensure consistency among the CNRFC-generated graphical RVF, the WFO AHPS webpage RVF, the text products issued by the CNRFC and the public text products issued by the WFOs.

The CNRFC will be testing the new format out with each WFO in its area of responsibility over the next few months to ensure a smooth transition before the next river flood season.

Forecast Point on Santa Clara River Moving

By Alan Haynes

Ventura County officials have requested to move the official river forecast point on the Santa Clara River from its current location at the Freeman Diversion, to Victoria Avenue in the city of Ventura. The current location is about 7 miles upstream from the city of Ventura.

River levels at the Freeman Diversion can fluctuate dramatically during active diversion periods, especially during low flows. These fluctuations can complicate river forecasting due to the uncertainty in flow. The Freeman Diversion control structure is used to recharge groundwater in the coastal plain. The new location should provide more stable readings and will become effective on August 1st.