The NHWC Transmission

December 2014

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NHWC 2013-15 Officers and Directors

Visualize Flood Risk with FloodSmart's Flood Risk Scenarios Tool

FloodSmart

The consequences of a flood can be devastating to families, businesses, finances, and the overall health of a community. It is something we hope that people will never have to live through or recover from. But because we know that floods are the most common natural disaster in the United States—in fact, all 50 states have experienced flooding in the last 5 years—it is a safe bet that most people and communities are at risk of flooding in the near future. Using the free Flood Risk Scenarios Tool available on FloodSmart.gov demonstrates that anywhere it can rain, it can flood. FloodSmart is the marketing and education campaign of the National Flood Insurance Program.

This tool demonstrates the different risk scenarios in which a flood can occur.

- Snowmelt is a common cause of flooding during the winter and early spring months. During these times, large amounts of runoff cannot be absorbed into the frozen ground. The water accumulates into lakes, streams, and rivers, causing excess water to spill over their banks.
- Flash floods are the most common severe weather emergency. A flash flood is caused by intense rainfall from one or more downpours, and can also be caused by the collapse of a man-made structure, such as a levee or dam.
- Construction and new development can change the natural drainage patterns in areas around buildings, parking lots, and roads, meaning less land is available to absorb excess water.
- Dams and levees also pose a flood risk. While these structures assist in the prevention of flooding, there are instances when it can still occur. Dams can become jammed with debris or can fail with the build-up of water pressure—or they can weaken over time and crack or collapse altogether. Levees can be overtopped or breeched.
- Tropical storms, hurricanes, and Nor'easters can bring several inches of precipitation in just hours. These heavy rains can lead to severe flooding by oversaturating the ground, overfilling storm drains, or causing rivers to spill over their banks or levees.

All of these examples are demonstrated in the Flood Risk Scenarios Tool and can help residents understand the many ways they may be at risk. Since floods can happen anywhere that it can rain, it's important that everyone is financially protected from the dangers of floodwaters. Flood insurance is available to residents and business owners in both high- and moderate- to low-risk areas. And because most policies take up to 30 days to go into effect, the time to act is now.

The Flood Risk Scenarios Tool is available for download through FloodSmart's Community Resource page. For those interested in using this tool, it can easily be embedded into websites. This tool, in addition to other tools and resources on FloodSmart.gov, can assist in educating communities about flood risks and educating residents about the need to purchase flood insurance that will help reduce the financial impact of flooding.

Flood Forecasting and Warning

effective flood hazard communication with uncertain forecasts

Murray Dale, CH2M HILL

Flood forecasts are always uncertain. We never know exactly how much rain will fall, where it will fall, how much will run off and where and when flooding will occur. We can make very good estimates of these with high resolution weather prediction models and hydraulics models but inevitably there are varying degrees of uncertainty in the forecasts due to the chaos in the atmosphere and the limits of our modeling. So how can people make effective decisions on what actions to take with flood forecasts that are uncertain?

A recent development to address this challenge is that of probabilistic or ensemble flood forecasts: producing not one but many plausible forecasts of what may happen[1,2]. In an ensemble, the forecast system runs many times from slightly different starting conditions and with small changes to the models to assess the uncertainty in the forecast. The range of possible forecast outcomes indicate the probability or chance of a flood of a certain impact occurring. While probabilistic forecasts have some distinct benefits (e.g. longer forecast lead times and a greater understanding of the range of possible outcomes), they pose an additional decision-making challenge to those that use them: with a range of forecasts to pick from, which one is right? Or which one(s) can enable me to make the correct decision?

In a recent project for the Environment Agency of England and Wales, CH2M HILL developed a risk- based decision support framework that

provides users with clear guidance to support their decisions when faced with an imminent flood threat. The decisions that are taken are on a wide range of possible activities. Relatively easy and low cost actions could be to increase the staffing of an incident room a number of days ahead of potential flood. This could be termed a 'low regrets' option: the impact of doing this is negligible while its potential benefit could be great. Probabilistic forecasts enable such activities to be initiated much earlier before an event occurs. At the other end of the scale, evacuating a community is highly disruptive and such decisions would be taken only if there is a high likelihood that not doing this could put lives in danger or have other serious consequences. Therefore, the decision support framework needed to be applicable for a wide range of possible activities and consider the likelihood as well as the consequence of the potential flood threat.

The approach we developed was designed to work for a wide range of flood risk situations, including coastal, riverine, and surface water cases, and was sub-divided into three levels complexity to make it proportionate to the imminent flood risk. So for some relatively low impact situations, a simple assessment of the number of forecasts in the ensemble that are above a specific threshold would be used to make a decision: e.g. if 40% of the forecasts predicted exceedance of a river bank level, an appropriate action could be taken. In a more high risk situation, where there are high potential flood losses, a full assessment of all the ensemble members is made. In this case, we devised a method to attach a flood impact value to each ensemble member. When these values are averaged they can be compared to the impact (monetary and human) of taking a flood warning decision. If one outweighs the other, a decision to initiate that action can be made. In this way, for the first time, a decision support method was developed that captures the extremes in the forecast, as well as the less extreme ensemble members, ensuring the full value is made of the probabilistic forecast. More information on this research is available in the Natural Hazards journal[1].

Knowing when to take local preventative measures (e.g. sand-bagging) can be informed through probabilistic flood forecasts.

Communicating probabilistic flood forecasts is also possible by using real-time flood maps. Mapped information can often be more powerful because people with little or no technical knowledge, as well as experts, can visualize the flood impact more effectively in an area that is familiar to them. Flood warning authorities also have the ability to run 'what if?' scenarios with interactive flood maps. Users can assess flood risk by running a likely range of potential flood volumes from the forecast models.

[1] Buizza R (2008) The value of probabilistic prediction. Atmos Sci Lett 9:36–42
[2] Cloke H, Pappenberger F (2009) Ensemble flood forecasting: a review. J Hydrol 375(3/4):613–626
[3] Dale et al, Probabilistic flood forecasting and decision-making: an innovative risk-based approach, Natural Hazards, January 2014, Volume 70, Issue 1, pp 159-172

11th National Hydrologic Warning Council Training Conference and Exposition: Advances in Hydrologic Warning – The Race to Save Lives, June 16-18, 2015, Indianapolis, IN

The Call for Presentation Abstracts for the 11th National Hydrologic Warning Council Training Conference and Exposition is now available. Scheduled for June 16-18, 2015 in Indianapolis, IN, the event will highlight **"Advances in Hydrologic Warning – The Race to Save Lives."** The conference provides a multidisciplinary hydrologic warning training experience for field personnel, engineers, hydrologists, forecasters, water resource managers, emergency management officials, and others. The program includes a wide range of technical sessions covering the needs of those just getting started to those with advanced needs.

For more information, see www.hydrologicwarning.org, or contact David C. Curtis, Ph.D., Program Chair, dcurtis@westconsultants.com.

The Community Rating System

Danny Hinson, Florida Division of Emergency Management

The Community Rating System (CRS) is a voluntary component of the National Flood Insurance Program (NFIP) that offers tremendous opportunities for improving the preparedness and resilience of those communities that participate.

It is well documented that CRS Communities experience a greater reduction in loss, post disaster, than non-participating communities. We must ask what we can do at the state level to support and promote the CRS and better floodplain management at the local level. In turn, participation in CRS will offer flood insurance policy premium reductions to residents and increase community resiliency.

The *Florida CRS Initiative* is being accomplished through the allocation of state personnel to assist communities with their program enrollment and continued participation. Florida has allocated funding to support activities and offer customized programs to improve CRS standing, such as various training activities, one-on-one visits to communities and state-wide outreach assistance. With support from the state for training, webinars and specific activity support, communities can increase their credit points and implement more comprehensive floodplain management programs at the local level.

Many states require local emergency management agencies to have plans in place for effective disaster response. The following activities should be included in such plans to protect lives and property:

- Alerting the public prior to a flooding event with details such as the expected spatial and temporal characteristics of the inundation area
- Disseminating property protection guidelines
- Identifying flood response operations and/or responsibilities
- Identifying critical facilities and resources

- Developing levee and dam safety maintenance programs, including
  - Failure recognition and warning systems
  - Identification of failure response operations

Using the National Incident Management System (NIMS), Incident Command System (ICS), is potentially worth CRS credit within the flood response operations activity. These activities are well documented in the 600 series of the CRS Manual found at www.crsresources.org.

Research from the Association of State Floodplain Managers (ASFPM) shows that approximately 65% of dams are privately owned and that their conditions are often unknown. A discussion of how best to identify, track and monitor these structures nationwide is needed. Most States have some sort of State Dam Safety (SDS) program recognized by the CRS. The SDS Officer can facilitate earning CRS credit by working with local communities to provide inundation mapping and to identify warning systems and emergency action plans.

At some point, federal, state and local governments must decide what part of buying down risk is appropriate. Developing more comprehensive emergency management programs and facilitating mitigation activities are proven successes and continue to build community resilience.

When development occurs we must ask: what is the risk to the resident, the community, the state or the federal government? Do we have appropriate emergency management standards and development regulations in place?

By supporting these efforts now, we can lay the groundwork for increasing resilient communities and lower the cost of disasters for future generations.

Southern California ALERT2 Network Users Group
Department of Water Resources Flood Emergency Response Grant
ALERT2 Training Symposium, December 9-11, 2014

Ventura, California

David Curtis, WEST Consultants / NHWC President

In late 2013, a consortium of Southern California ALERT agencies, led by Ventura County, CA, received a Flood Emergency Response grant of nearly $900,000 from the California Department of Water Resources (DWR) to support the transition from legacy ALERT technology to ALERT2. The grant included funding for network design, equipment, and training.

With approximately 1000 sites and 40 repeaters, the Southern California ALERT Network (SCAN) is more complicated than most ALERT systems in other areas of the country. Since most repeaters are shared by multiple agencies, regional planning is imperative.

In order to receive the funding for the necessary ALERT2 hardware upgrades, The California DWR required the development of an ALERT2 Network Design and Transition plan for the entire southern California ALERT network. Ventura County engaged OneRain, Inc. supported by Telos and WEST Consultants to develop the transition plan.

The ALERT2 Training Symposium brought together Southern California ALERT agencies, the ALERT2 network design team, and ALERT2 vendors for three days to discuss the network transition plan, tools for managing ALERT2 transition and vendor implementation approaches.

On the first day, the network design team presented an overview of ALERT2 designs being implemented by other agencies, the ALERT2 protocol and components, a TDMA management tool, and ALERT2 best practices.

A brief comparison of ALERT and ALERT2 performance during the December 3, 2014 rainfall event in the Sacramento area was presented. During the event, hourly and daily rainfall amounts in some locations approached or exceeded the 100-year values. Data from legacy ALERT stations showed the expected evidence of data loss, especially during the most intense (i.e. high data traffic) portions of the storms. The opposite was true for the ALERT2 stations which successfully reported nearly all of their data.

The second and third days were focused on ALERT2 vendors and services. HydroLynx, Water & Earth Technology, High Sierra Electronics and Campbell Scientific were represented. Topics ranged from installing ALERT2 base station receiver/decoders, ALERT2 transition services, new and ALERT2 upgrade options, ALERT2 applications and base station data analyses comparing ALERT and ALERT2 data.

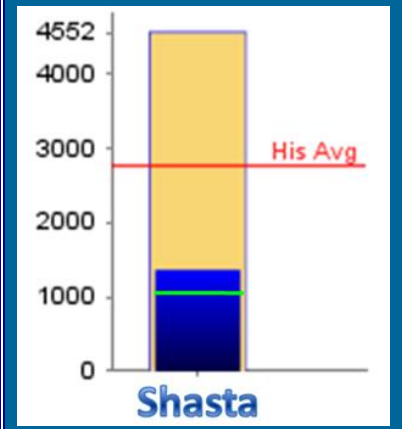
The symposium was an important step in the process of transitioning a large, cooperative ALERT network to ALERT2.

California Drought Update

A series of Pacific storms, including a significant “atmospheric river” event, slammed into California over the first two weeks of December. Some locations received well over a foot of rain with widespread totals in the 6-12 inch range being reported.

The precipitation was welcome relief for a state parched from three years of record high temperatures and record low rainfall. However, conditions in the state have been so dry, any rises on local rivers have been relatively minor.

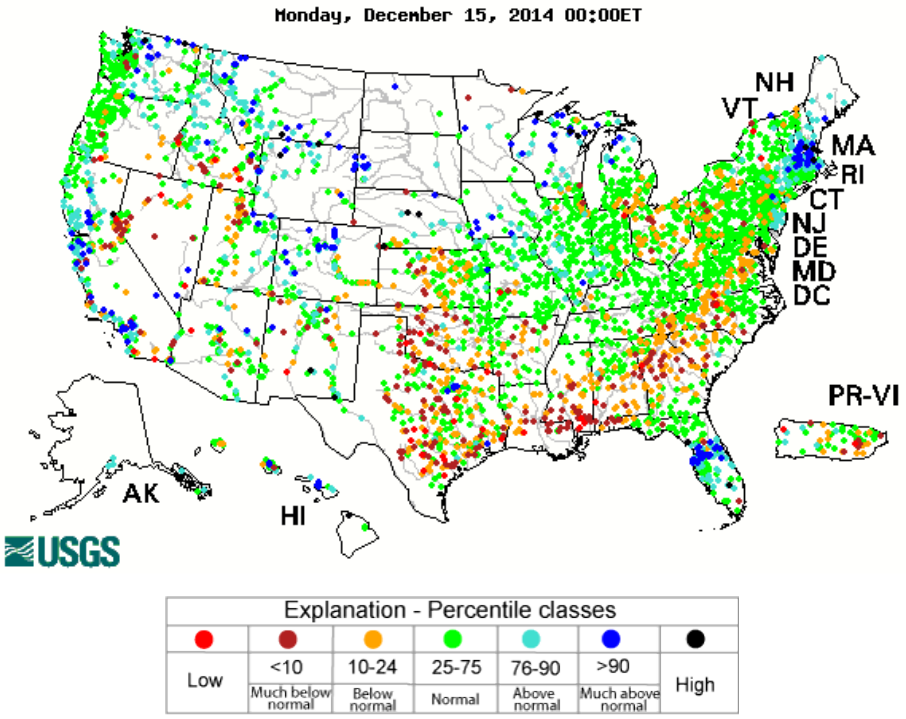
The state’s major reservoirs are way below historical averages and the recent rains have barely made a dent in the deficit. The chart below shows the change in storage in California’s largest reservoir, Lake Shasta, from December 3rd to the 13th. Reservoir elevation rose 27 feet just to reach 30% of capacity.



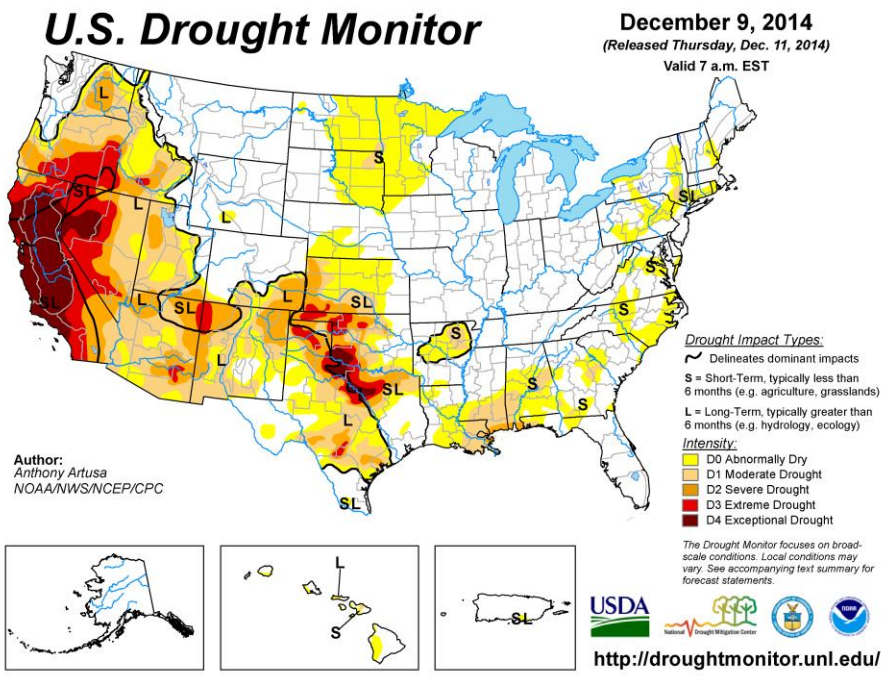
Lake Shasta Storage in 1000s of acre-feet.

(Chart adapted from California Department of Water Resources)

Hydrologic Conditions in the United States
Through November, 2014



Latest stream flow conditions in the United States. (courtesy USGS)



Latest drought conditions in the United States. (courtesy National Drought Mitigation Center)

January Newsletter Articles Focus:

Modeling & Analysis

The NHWC is requesting articles that focus on practices, technologies and tools used to model/predict hydro-meteorological events and to support decision making for emergency response and floodplain management.

Submit your article to:

editor@hydrologicwarning.org

January 5th is the deadline for inclusion in the January issue.

Future Newsletter Articles Focus

To give you more time to prepare articles, below is the article focus schedule for the next four months:

Jan - Modeling/Analysis
Feb - Data Collection
Mar - Hydrology
Apr - Hazard Communication & Public Awareness

Membership Renewal

It's time to renew your Annual NHWC Membership. New members are welcome. Click **here** to join/renew your membership.

NHWC Calendar

June 15-18, 2015 - NHWC 2015 Training Conference & Exposition, Indianapolis, Indiana

General Interest Calendar

January 4-8, 2015 - 95th American Meteorological Society Annual Meeting, Phoenix, Arizona

February 4-5, 2015 - ASDSO Emergency Action Planning for Dam Safety, Phoenix, Arizona

May 17-21, 2015 - World Environmental & Water Resources Congress, Austin, Texas

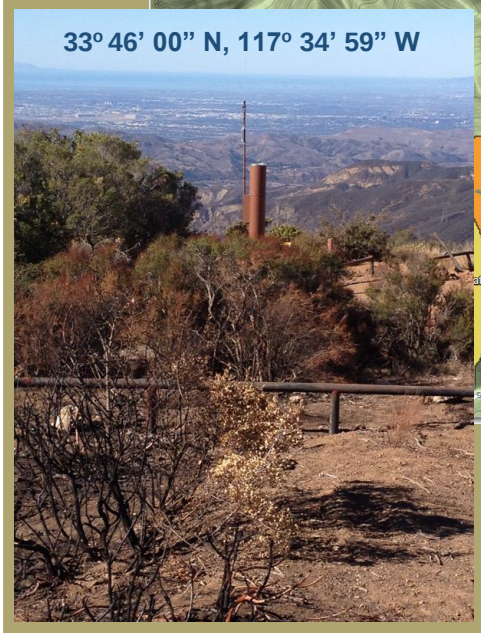
May 31-June 5, 2015 - Association of State Floodplain Managers (ASFPM) Annual National Conference, Atlanta, Georgia

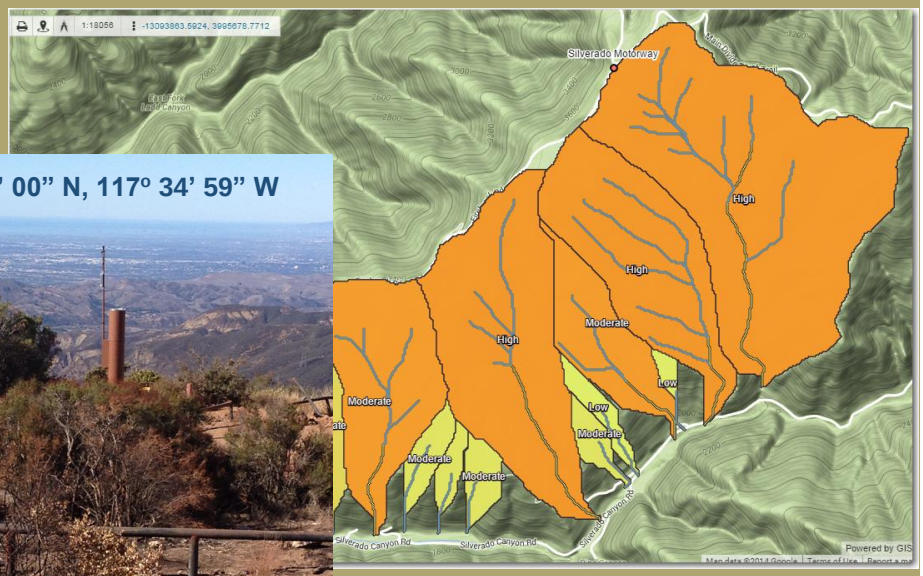
July 19-22, 2015 - 40th Annual Natural Hazards Research and Applications Workshop, Broomfield, Colorado

(see the event calendar on the NHWC website for more information)

Parting Shot

Silverado Motorway ALERT Station





This ALERT Station was recently installed by the County of Orange OC Public Works to monitor watersheds burned recently by the Silverado Canyon Fire.

Photo by Bryan Pastor, County of Orange OC Public Works

National Hydrologic Warning Council

Providing Timely, Quality Hydrologic Information to Protect Lives, Property, and the Environment

http://www.hydrologicwarning.org