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## Tweeting from the Schuylkill River

David Haynes, Distinctive AFWS Designs, Inc.

Social media outlets such as Facebook and Twitter have rapidly become valuable tools used to disseminate weather and flood hazard information. Some, like Twitter, have been integrated directly into data collection systems configured to “tweet” data. Twitter’s powerful search algorithms scan the universe of tweets looking for specific tags identifying tweets as data which are collected by “followers.” One such example was recently deployed by Upper Providence in Montgomery County, Pennsylvania, on the Schuylkill River.

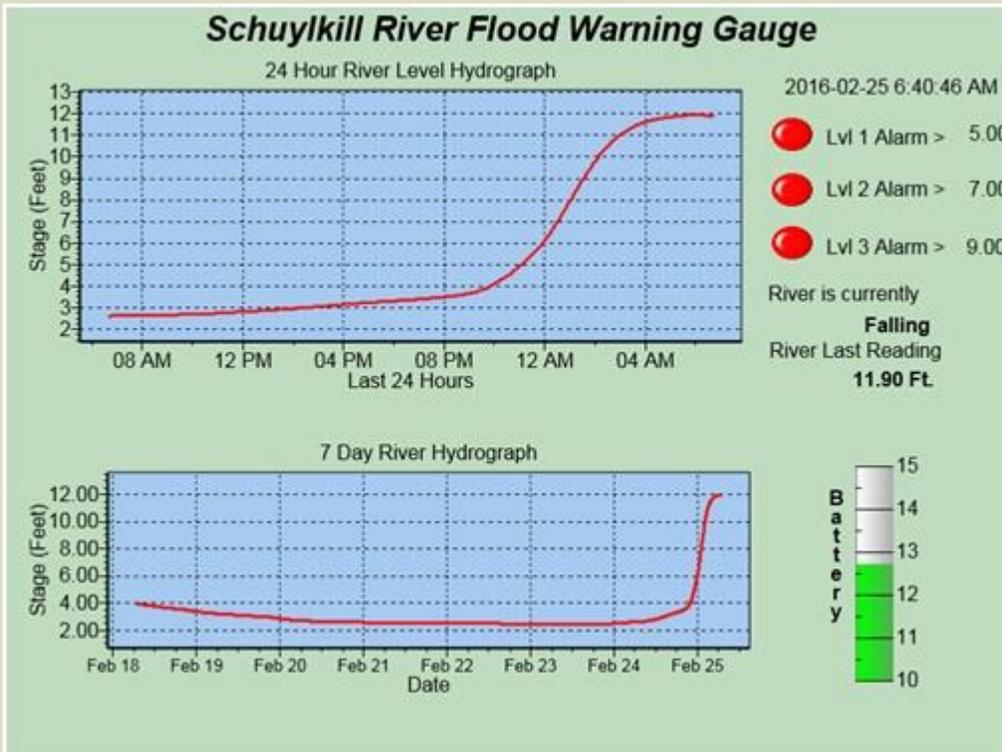
The Schuylkill River is roughly 130 miles in length and has a drainage area of 2,000 square miles in central and eastern Pennsylvania. Located about 25 miles upstream from Philadelphia, where the Schuylkill River joins the Delaware River, lies the Township of Upper Providence in Montgomery County. This 18 square mile suburban community is populated by 22,219 people and contains a host of geographical features.

Like many communities throughout Pennsylvania, the community prides itself on their award winning multi-use trails that run adjacent to the beautiful scenic river. In the past few years, however, the community has had several damaging floods to both residential and commercial properties with no real warning. The closest automated gauging stations on the river to Upper Providence are upstream in Pottstown (about 15 miles) and downstream in Norristown (about 10 miles). Between these two gauges are more than 600 square miles of drainage basin.

Due to the flooding history along this stretch of the river Township officials identified the need for a local automated gauging station that would provide current water levels in real-time. With funding being made available by municipal officials, the Township’s Department of Fire and Emergency Services worked with Distinctive AFWS Designs, Inc. to design and build a real-time river monitoring station. After many conversations about system design options it was concluded that the most effective design would be a gauging station with a built-in webpage and notification system.

The gauging station consists of a Campbell Scientific CR6 Data Logger, a CS451 submersible pressure transducer, a 12VDC battery and 20 Watt solar charging system, and a RAVEN XT cellular digital modem. Water level is measured every 10 seconds and the data logger records 1-minute and 5-minute interval averages (to dampen out surface turbulence). The logged data are used to populate the station’s internal webpage as shown in Figure 1 (next page). The webpage returns current readings, long term trends, and alarm states to aide in decision making.





The hydrographs use the 5-minute average and the "River Last Reading" value returns the latest 1-minute average. The river state (Rising, Falling, or Steady) is determined by comparing the last three 5-minute averages for changes.

Anytime the water level reaches a defined alarm threshold the data logger sends out level specific email/text notifications to emergency responders and identified public officials. The email/text group list is maintained by the Emergency Management staff on their email server (not in the gauging station). As a means of ensuring proper operations, a "heart-beat" email is sent out to selected individuals

Figure 1. Schuylkill River Gauge internal website. The website displays the 24 hour and 7 day hydrographs. On the right are the stage alarm levels that have been identified. (For demonstration purposes the Lvl "x" alarm values on upper right side were lower than actual to show the "Active State".)

at noon every day. There are also "maintenance" related notifications that can be sent out such as low battery and/or intrusion.

The second page of the station's webpage includes impact statements related to the measured and reported water levels (Figure 2). The elevations for impact were determined after a professional survey was conducted of key hazard points along the river and related back to the water levels that would be measured at the gauge.

Stage (feet)	Impact
27.4	100 Yr Flood
26.9	Inlet Rt 29/Walnut
22.4	Restroom @ Dog Park
19.4	Inlet Needle/Walnut & 10 Yr Flood
18.8	Inlet Rt 29 Under Tracks Borough
17.0	Level 3 Alarm Issued
15.6	Spillway Lock 60 Forebay
14.4	Spillway Crest @ Canal St
13.0	Level 2 Alarm Issued
11.3	Inlet @ 205 Canal St
10.0	Level 1 Alarm Issued
0.0	Gauge "Zero" Datum

Location 40°07'39.4" and -75°28'46.4". The water level sensor elevation is 68.6 feet AMSL (NAVD88). It measures the water level every 10 seconds and produces both 1-minute and 5-minute averages at each interval. Reported levels on the main page are feet above sensor. These will match the "Stage" values shown in the Impact Statements to the left.

All data contained on these pages are PROVISIONAL and subject to change. Use of this data must take this into account.

The gauge is owned and operated by the Upper Providence Township Department of Fire and Emergency Services. It was placed in service on October 22, 2015.

Figure 2. Impact statements located on the station's second webpage explain alarm levels within the context of previous flood events and infrastructure at the site. This serves as an aide to emergency responders and decision makers.

All of this was intended for emergency responders and public officials. However, recent extreme flooding events has shown that social media is an important medium for informing the general public about hazardous conditions. Therefore, a Twitter account ([www.twitter.com/fwg\\_Schuylkill](http://www.twitter.com/fwg_Schuylkill)) was created for the gauging station and the system was configured to post Tweets with the current river level every hour as well as anytime an alarm threshold is reached (Figure 3, next page).

Last month the Twitter page was made public so that anyone can follow it. In the future, the use of #hashtags will be imbedded in appropriate Tweets to better enable followers to stay informed. We are still working with a Twitter Developer Advocate to improve the automated tweeting experience and the information presentation through the use of IoT (internet of things) platforms.

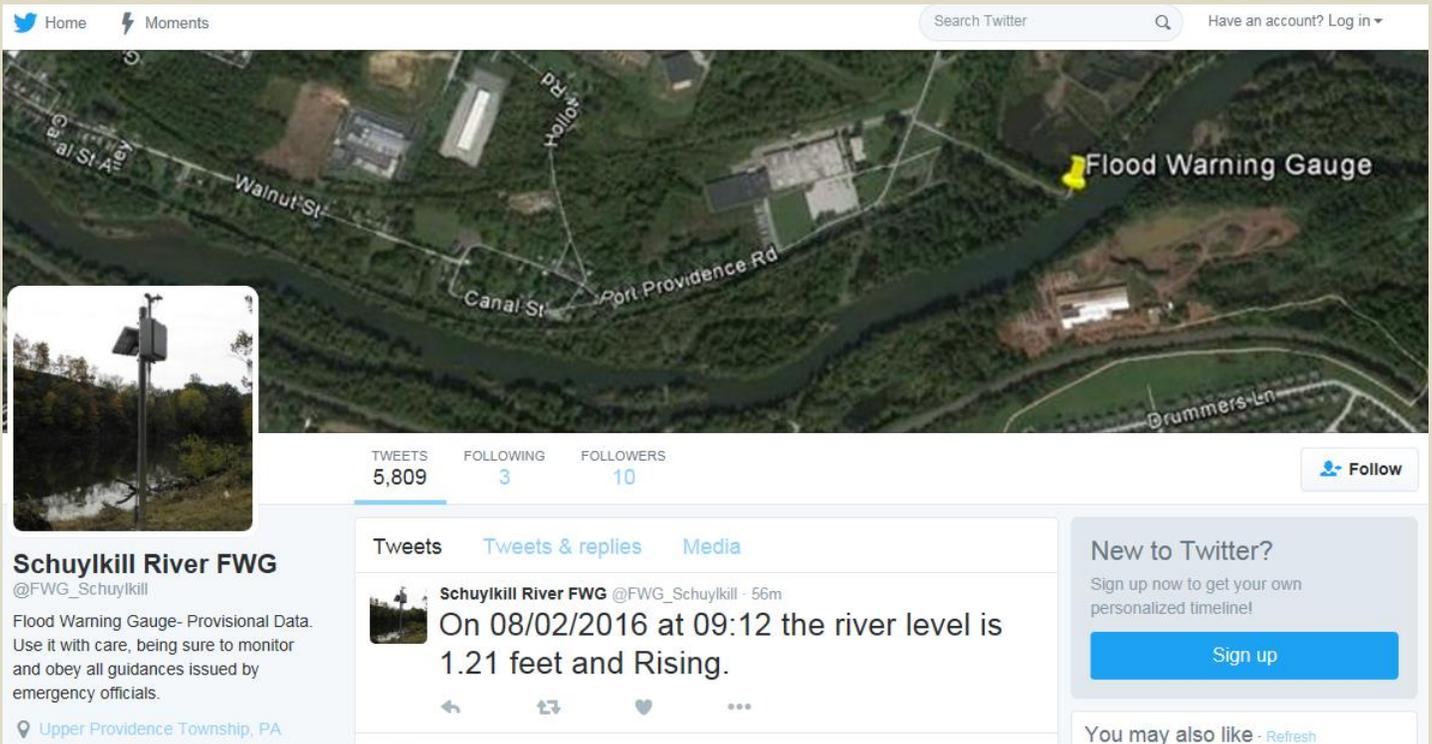


Figure 3. Example screenshot of the Schuylkill River Twitter site. (Please follow us.)

There are other potential uses and applications for getting gauging station information directly to the general public via social media. One of the driving forces in this particular design (and for potentially many others around the country) was the additional costs related to building a network/infrastructure to get data from the gauging station to a traditional flood warning computer system AND the ongoing maintenance efforts and costs for those networks and systems. Once the webpage and email notifications to emergency responders were implemented, the costs for including Tweets for general public access were negligible – a Win-Win! 🌊

## The El Niño of 2015-2016 in Ventura County

Bruce Rindahl, Ventura County

During the summer of 2015, the National Weather Service began forecasting one of the highest El Niño seasons in recent memory. The potential for above average rainfall and severe storms in Southern California after several years of drought was a concern for emergency managers in the county. In order to educate the public on the preparations underway in the county, a program of public engagement was accomplished in the fall of 2015.

A series of six Town Hall Meetings were held from September to November. These meetings were held through the county as well as two communities recently impacted by debris flow. Representatives from the county and local Police and Fire departments, the local Red Cross, Animal Services as well as the National Weather Service and the County Public Works Agency



One of six town hall meetings

presented the steps underway for the upcoming season. Question and answer sessions after the presentations for the public to express concerns and ideas for preparedness. Over 1000 members of the public attended these evening meetings throughout the county. ➔

In September, the county held its annual “Storm Day” exercise with particular emphasis on a severe flooding event similar to the storms of 2005. The operation was coordinated by the Sheriff’s Office of Emergency Services and included all local agencies who would respond in this type of event. The local newspaper included a feature article on the successful exercise. A “Sandbag Saturday” was held in December by the County Fire Department which featured a readiness fair with important information and tools on how to create an emergency kit and evacuation plan, register for emergency notifications, and prepare homes for heavy rainfall and a drive through area where first responders loaded ten pre-filled sandbags into each car. Finally, a special web page was created on the Ready Ventura County emergency preparedness web site with specific information on flood preparation, links to the National Weather

Service, Red Cross, Fire Departments, Animal Services, and Ventura County Flood Warning System. The flood warning system provides real-time rainfall and streamflow readings via the county’s ALERT network. This flood warning system proved extremely valuable and resilient during a significant rain event in January 2016. For a four-hour period during the storm, the web server was responding to over five rainfall data requests per second from almost two thousand distinct users viewing the rainfall map display. The preparations were considered a success, however the hoped for rainfall did not materialize. Above average rainfall stayed well north of Southern California which stayed locked in a historic drought. Undaunted, the county will continue to upgrade and maintain its flood warning system and expand on the public outreach programs enacted for the 2015-2016 El Niño season. ☺

## The Use of Social Media for Flood Warning in New Jersey: New Perspectives

Mariana Leckner, Leckner Consulting, LLC

Chris Tucker, Manasquan Borough (NJ) Office of Emergency Management

Well, it’s 2016 and while the words “social media” may still strike fear in some folks, the reality for emergency managers is that it is a useful, effective and powerful tool. It can also bring a host of concerns, but for this brief article we will focus on how the use of social media has proven to be an effective tool for delivering flood warning information in New Jersey.

In 2012 before Hurricane Sandy spun towards New Jersey, social media was not a widely used tool in government, particularly in emergency management. It was mostly viewed as something for younger generations to use to chat with each other – that generation’s version of the telephone – and it was seen as an uncontrollable wildcard. Emergency managers were concerned with its effectiveness. Who was using social media? Kids? Would they convey messages to parents and other household decision-makers? Were adults using it? Really? Few people thought so, other than using Facebook to share pictures with faraway relatives. Twitter? That seemed like a platform for celebrities or companies to push their brand and for youth to share minutia of their day \*nice lunch\*.

Despite the perception of social media pre-Hurricane Sandy, a few forward-thinking

jurisdictions and emergency managers began to embrace these platforms as effective ways to communicate immediate and timely information with the public, particularly for residents away from homes and people who had lost power. The Federal Emergency Management Agency sponsored a social media training session for Manasquan, NJ as a pilot community just months before Hurricane Sandy’s landfall in New Jersey. Manasquan’s use of social media during that disaster proved to any doubters that social media in fact can and does reach a wide audience, can and does spread effective official messages, and can and does help bridge gaps in communication so essential to helping residents and visitors navigate the uncertain and possibly frightening aftermath of disaster.

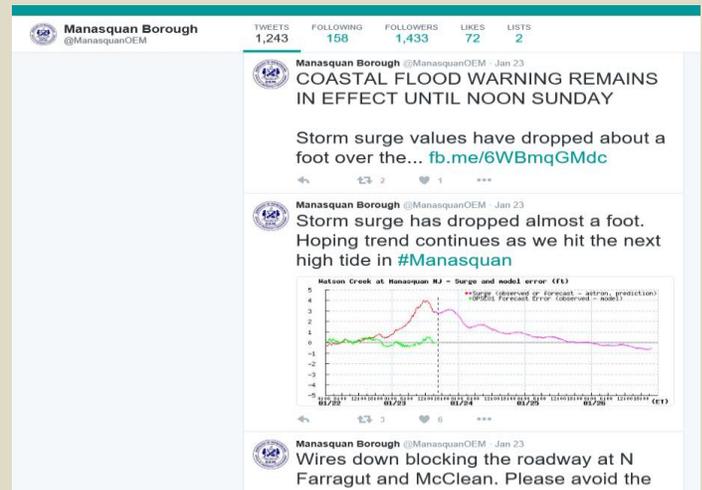
### Case Study: Manasquan, New Jersey

When the lights went out with the landfall of Sandy on October 29, 2012, so did cable and telephonic communications, and much of Manasquan remained in the dark for over a month. Areas were devastated, and residents were anxious to learn the fate of their homes, yet were unable to access disaster areas due to public safety concerns. This is where social media began to make an indelible mark on the

way Manasquan communicates emergency information. As damage assessment teams cataloged the destruction, municipal employees posted these same digital photos on Facebook so that residents were able to see the extent of damage to their neighborhood. These pictures generated a ton of interest, as they were some of the first images to be widely distributed via social media in the aftermath of Sandy. Manasquan's Facebook updates also included information on power and gas restoration, curfews, re-entry procedures and supplies. In a matter of days, Manasquan's Facebook page truly became the go-to hub for municipal emergency recovery information.

Since 2012, much has changed on the emergency communications front. Social media has been formally incorporated into the Alert, Warning & Communications Annex of the municipal Emergency Operations Plan. Manasquan's Office of Emergency Management (OEM) has integrated instantaneous posting of National Weather Service alerts through the use of iNWS to both Facebook and Twitter. All municipal emergency messaging is sent out using traditional methods such as local AM radio and a reverse telephone calling system (BrightArrow®), is now also immediately posted via social media. The ability to post weather-related graphics and other emergency preparedness information allows for greater flexibility than traditional communications, and results in better engagement with larger audiences. Manasquan

currently has over 5,700 followers on Facebook and 1,400 on Twitter. For a town with a year-round population of 5,757, it is clear that the outreach of social media is one of the most important tools that municipal OEM officials have on hand to communicate with the public.

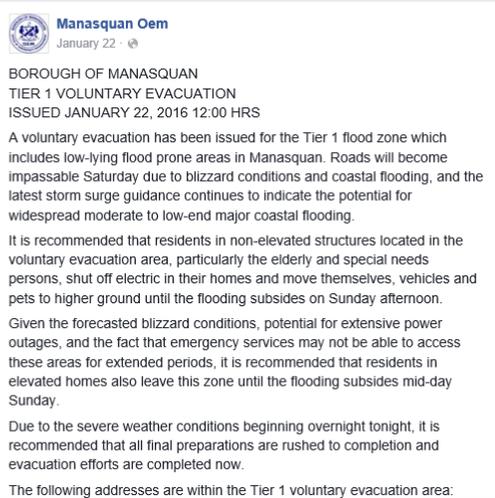


January 23-24 Flood Event Communications via Twitter: @ManasquanOEM

### Flood Warnings and our Social Media Future

Certainly, a wide variety of methods are used to communicate flood awareness, watches and warnings statewide to reach the most people possible: the Emergency Alert System, television, radio, route alerting within communities, reverse call notification systems, texting services and other methods, but social media has become a darling of emergency management in New Jersey. Gone are the days when we feared social media as an uncontrollable environment, and present today are the confidences of these expeditious and broad-based communications methods that are amplified effectively to even broader audiences. Are there issues to be found? Of course, rumors and misinformation also circulate through the veins of social media, but an alert social media manager can watch for trends, topics and conversations to interject, correct and clarify facts in real time.

The future promises additional growth in the use of social media platforms to communicate flood hazard risk, watches and warning, and will continue to serve as a catalog of damage and virtual meeting place for jurisdictions, their residents and visitors. For examples from Manasquan, New Jersey, follow Manasquan OEM on Facebook (<https://www.facebook.com/ManasquanBorough>) and Twitter (@ManasquanOEM).



Manasquan NJ Office of Emergency Management Facebook Page

# NWS Hazards Simplification Project



Michael Bilder, National Weather Service

The National Weather Service (NWS) will be conducting a number of online surveys regarding the NWS Watch, Warning and Advisory (WWA) system in the coming months, some of which will be of particular interest to members of the National Hydrologic Warning Council. The surveys are coming out of the NWS Hazards Simplification (“HazSimp”) Project, which was established to analyze the use and effectiveness of the WWA system and evaluate possible changes. Below are explanations of the three surveys that are immediately relevant to the water community. Your feedback will play an important role in any decisions on how to improve NWS hazard messaging.

## **Survey #1: WWA "Institutionalization" Survey**

**Purpose:** To assess the extent to which decision-making entities (at all levels and in various sectors) have formally incorporated (aka "institutionalized") the WWA products into their written decision-making processes via policies, protocols, laws, etc. For instance, are there water managers out there with a written policy that says if a Flood Watch were issued, then XYZ needs to happen? The answer to this question will help NWS understand the potential policy impact on various key partners if NWS were to make changes to the WWA system, such as changing the name, nature or scope of a particular WWA product.

**Time of release:** Late Summer/Early Fall 2016

**Duration:** 4 weeks

## **Survey #2: Flood Advisory/Watch & Winter Weather Advisory Consolidation Survey**

**Purpose:** To collect feedback on 2 possible near-term changes to the WWA system: 1) to consolidate certain flood-related advisory and watch products into a single product and improve message formatting; and 2) to consolidate certain winter-related advisory-level products into a single Winter Weather Advisory and improve message formatting.

**Time of release:** Fall 2016

**Duration:** 30 Days

## **Survey #3: Prototype Demonstration -- Flooding Episode Survey**

**Purpose:** To collect feedback on how well each of 3 prototype hazard messaging systems (representing a range of alternatives to the current WWA system) perform in a flooding scenario.

**Time of release:** Winter 2016/2017

**Duration:** will remain open until all of the Prototype Demonstrations episodes are done

**Note:** *the release of this specific survey will depend on available time and resources.*

Feel free to reach out to Mike Bilder at NWS (301-427-9059 or [michael.bilder@noaa.gov](mailto:michael.bilder@noaa.gov)) if you have any questions. 🌤️

## **2017 National Hydrologic Warning Council Training Conference & Exposition**

June 5-8, 2017, Squaw Valley, California

To join the conference planning committee, contact the co-chairs **Andy Rooke** or **Jean Vieux**.  
Click [here](#) to see the conference web page.

## Registration is Open for NHWC Northeast Regional Workshop

The National Hydrologic Warning Council is presenting

**“Prepare to Protect, Advancing Community-Based Flood Warning”**

at the Desmond Hotel and Conference Center in Albany, New York, September 20 – 21, 2016

This workshop has been pre-approved for 10 CECs for CFMs. Click [here](#) for the preliminary agenda.

The 2-day workshop has a low registration fee of just \$75 for NHWC members and \$100 for non-members. Exhibiting and sponsorship opportunities are also available. Keep watch at this [location](#) for the latest information. To register, use this [link](#).

## Save the Date

The **ALERT Users Group Fall Training & Meeting** will be held October 20th, 2016 at the San Diego County Flood Control Facility located at 5500 Overland Ave., Room 120 in San Diego, California

Emphases of this year’s meeting will be ALERT 2, and interagency coordination and preparation for this coming winter. An afternoon technical workshop will include presentations related to ALERT system maintenance.

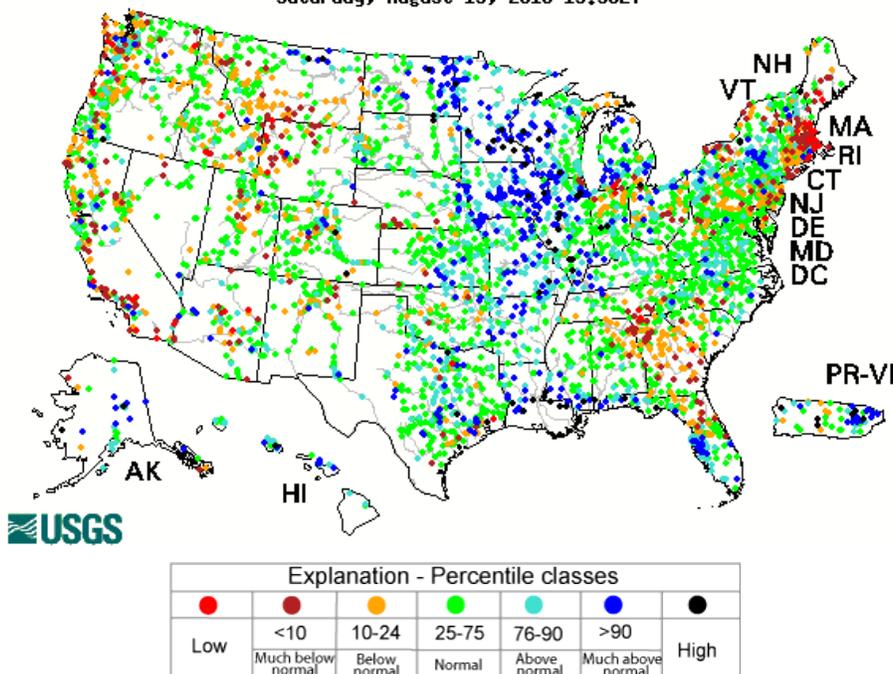
The workshop will finish with user reports and vendor announcements. The AUG board members are looking forward to seeing you there.

To register, please RSVP to Robert Laag at: [relaag@rcflood.org](mailto:relaag@rcflood.org) or call him at (951) 955-1232 by October 14, 2016.

Download the [workshop flyer](#) for more information.

## Hydrologic Conditions in the United States Through August 9, 2016

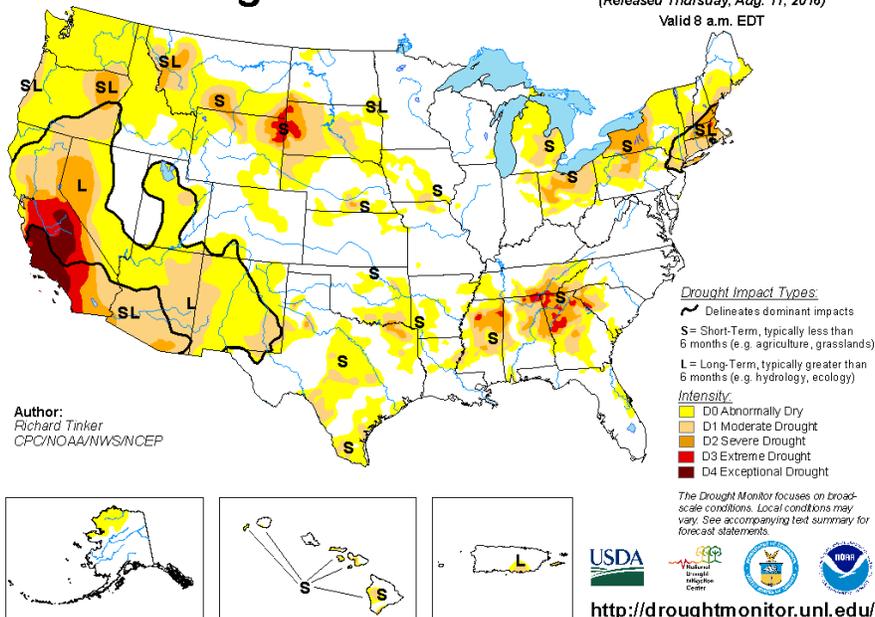
Saturday, August 13, 2016 19:30ET



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

## U.S. Drought Monitor

August 9, 2016  
(Released Thursday, Aug. 11, 2016)  
Valid 8 a.m. EDT



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

## September Newsletter Articles Focus:

### Modeling & Analysis

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

Submit your article to:

[editor@hydrologicwarning.org](mailto:editor@hydrologicwarning.org)

September 5<sup>th</sup> is the deadline for inclusion in the September issue.

## Future Newsletter Articles Focus

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

**Sep- Modeling/Analysis**  
**Oct - Data Collection**  
**Nov- Hydrology**  
**Dec- Hazard Communication & Public Awareness**

## NHWC Calendar

September 20-21, 2016 - [NHWC Northeast Regional Workshop](#), Albany, New York

June 5-8, 2017 - [NHWC 2017 Training Conference & Exposition](#), Squaw Valley, California

## General Interest Calendar

August 22-25, 2016 - [National Association of Flood & Stormwater Management Agencies Annual Meeting](#), Portland, Oregon

October 20, 2016 - [The ALERT Users Group Fall Training and Meeting](#), San Diego, California

May 21-25, 2017 - [American Society of Civil Engineers, EWRI World Environmental & Water Resource Congress 2017](#), Sacramento, California

(See the [event calendar](#) on the NHC website for more information.)

## Parting Shot

### Three days before the July 30, 2016 Ellicott City flood



This new ALERT2 stream gauge (South Entrance Road @ US 29) was installed on the Wednesday before the Saturday night Ellicott City floods. This ALERT2 station is located on the Little Patuxent River along US Highway 29 south of Ellicott City, Maryland. The new gauge reported a peak stage Saturday of approximately 16 feet, which reached nearly half way up the pole.

Photo by **David Haynes**, Distinctive AFWS Designs, Inc.

## National Hydrologic Warning Council

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

<http://www.hydrologicwarning.org>