The NHWC Transmission

December 2012

CONTENTS

USGS Flood Inundation Mapping Program

Helping Communities with Risk Awareness, Flood Planning, and Response

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The USGS is partnering with the National Weather Service (NWS) and U.S. Army Corps of Engineers (USACE) under the Integrated Water Research Science and Services (IWRSS) consortium to move the science of Flood Inundation Mapping (FIM) forward for the primary purpose of improving public safety, along with other important benefits including understanding changing natural processes that produce hazards, testing of methods and hydrologic boundary conditions for FIM, development of hazard mitigation strategies and technologies, effectively reducing vulnerability and repetition of loss to infrastructure, and the promotion of risk- wise behavior.

An interagency team, under the IWRSS umbrella and composed of representatives from the NWS, USACE, FEMA, and USGS, is meeting to develop Federal guidelines and standard practices for the creation of hydraulic and elevation models and the dissemination of flood inundation maps. The results of the team's efforts will be incorporated into a design and then implemented as common Federal interagency flood inundation map practices with common web mapping services and a mapper.

As of November 2012, flood inundation maps are available on the USGS Map Services Viewer (http://wim.usgs.gov/FIMI/) in 20 separate stream reaches located in 13 states. Most of the stream reaches are located in the Midwest and Northeastern US. In recent months, enhancements have been made to the mapper to support additional forecasting information from the NWS. The enhanced hydrograph display allows the user to see the hydrograph with the Flood Warning colors and click anywhere in the data (past or future) and see the modeled inundation for the nearest stage (figure 1). We are also working on additional ways to view historical flood information which will allow the user to better set the current flooding conditions in a personal historical context (figure 2). Future plans also include enhancements to the web services and additional printing capabilities to allow users to print more relevant maps for their situations.

The USGS is using the knowledge and experience of its scientists to expand the science of model development and flood inundation mapping. Efforts are underway to evaluate the process and utility of developing flood inundation maps in additional geographic areas and hydrologic settings of the US. These efforts will be spearheaded by ➡

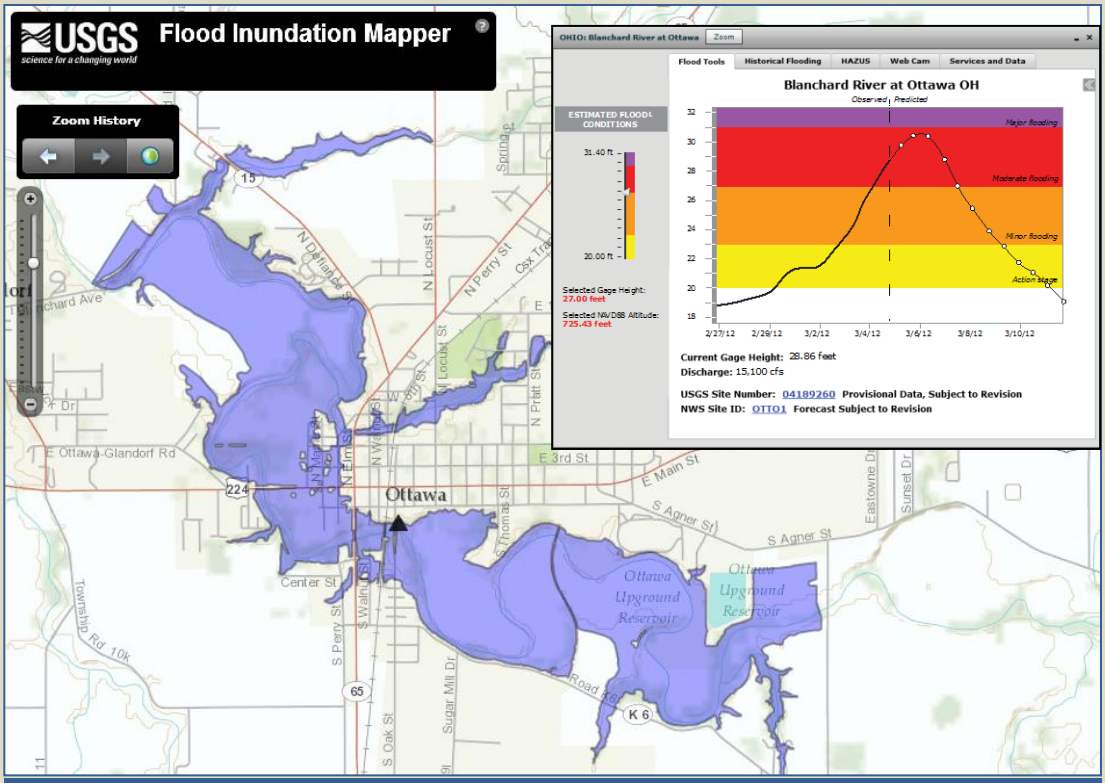


Figure 1. Screenshot of the Blanchard River at Ottawa, Ohio showing moderate flooding and the interactive hydrograph tools.

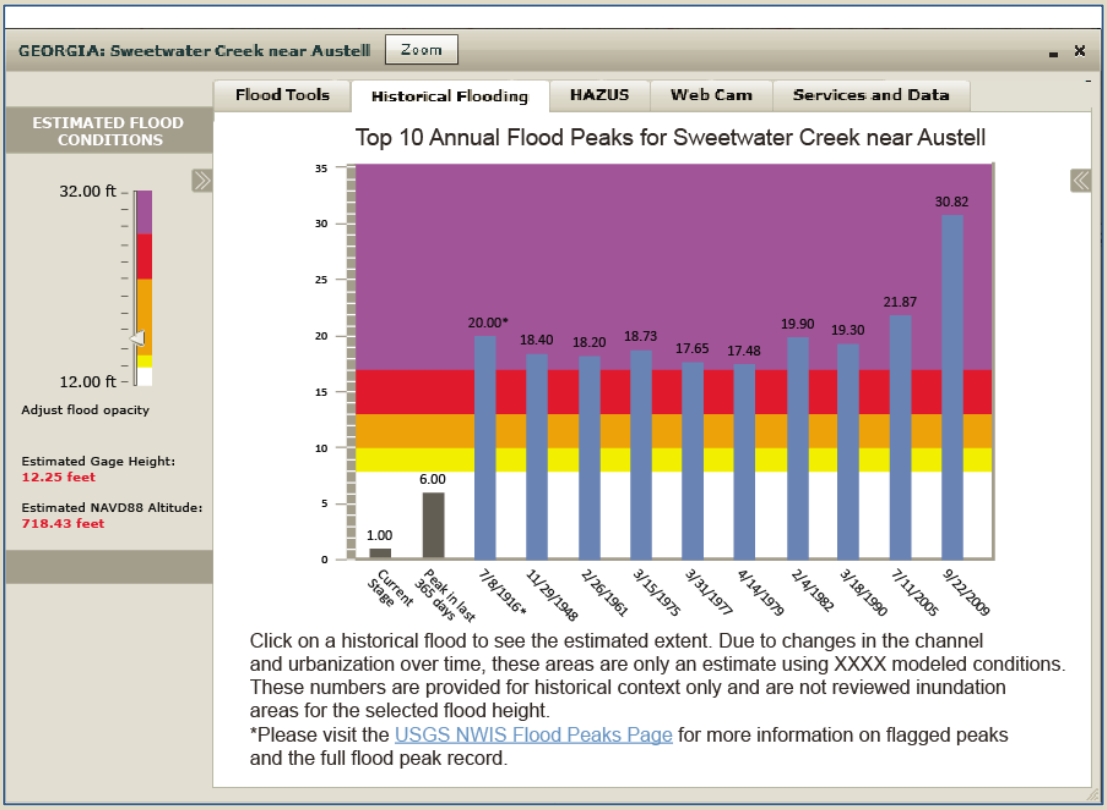


Figure 2. Mockup of possible historical flooding tools. The bars present the top ten flood events recorded by the USGS gage and are linked to the closest inundation stage.

internal regional Flood Science Teams. Alternative methods for developing lower-resolution and lower-cost maps that can be produced in shorter time periods also are being evaluated by the USGS. The utility of using existing resources such as archived satellite images and aerial photography col-lected during high water conditions at or near co-located USGS stream gage and NWS flood forecast locations is being evaluated. The goal of the effort is to produce a one-map or two-map snapshot of flood inundation tied to a stage at a USGS stream gage. In addition, extracting stage-based maps from FEMA's DFIRMs is being evaluated as a reduced resource flood inundation mapping method.

These alternative methods, if deemed technically valid and with an acceptable level of uncertainty, will allow more wide-spread coverage of flood inundation maps at NWS flood forecast locations at a much higher rate than could be accomplished using more intensive modeling techniques.

Responding to a Flash Flood Threat When the Sky is Blue

Baxter Vieux, PhD, P.E. - Vieux & Associates Inc.
Kevin Stewart, P.E., Urban Drainage and Flood Control District

The September 6, 2010 Fourmile Canyon wildfire changed hydrologic conditions and increased the potential for flooding downstream. Areas impacted by the burn area are along Gold Run, Fourmile Creek, Fourmile Canyon Creek and Boulder Creek in rural areas of Boulder County, and in the City of Boulder, Colorado. The Fourmile Canyon Fire burned an area of 6,179 acres composed primarily of open ponderosa pine in the foothills approximately 5 miles west of Boulder's city limits. The wildfire also destroyed 169 structures, mostly private homes, and until 2012 was considered Colorado's most damaging wildfire. Since that fire the flash flood forecasting system which had been in place since 1979 was substantially enhanced by the Urban Drainage and Flood Control District (UDFCD).

The new flash flood forecasting system leverages a physically-based distributed hydrologic model, and inputs derived from a combination of radar and gauge measurements in real-time. Continuous forecasting of flood potential took place during the 2011 flood season and again in 2012. Predictive hydrologic information was used to generate flood threat alerts based on discharge thresholds at critical locations in downstream areas receiving runoff from the burn area. In some cases, storms over the burn area can produce potentially dangerous flood conditions in far removed locations.

Figure 1 shows conditions on July 30, 2012 on Fourmile Canyon Creek where it flows under Broadway, a main thoroughfare in the City of Boulder. This location was forecast to receive a peak of about 200 cfs arriving at 5:00 pm MDT based on operational hydrologic/hydraulic modeling with radar and rain gauge input. Onsite observations (there is no stream gauge established at this location) confirmed that it did indeed peak within a few minutes of the forecast time and that the estimated impacts were accurate.

Confidence has been gained over two flood seasons, 2011 and 2012, with a flash flood forecasting system that predicts when and where flooding is expected in diverse locations downstream of the Fourmile Burn Area (FBA). Due to the relatively quick hydrologic response of these mountainous watersheds, warning lead-times can leave little time for taking emergency actions, ranging from minutes to over an hour depending on distance downstream.

The modeling approach integrates diverse watershed characteristics, such as terrain, land use and vegetative cover along with gage-corrected radar-based rainfall to simulate the hydrologic effects of the wildfire. The model was initially deployed without calibration using physically-realistic model parameters and assuming zero infiltration in the burn area, i.e. the worst case scenario. After the first significant runoff event on July 13, 2011, the ➡

Figure 1. Forecasted flood conditions on July 30, 2012 on Fourmile Canyon Creek near the bike path and walkway passing through box culvert under Broadway in the City of Boulder.

infiltration rates were adjusted to just under 0.1 inch/hour to be more representative of the wildfire's effect on the burn area.

Flood forecasting requires a spatial and temporal rainfall distribution that is representative of how rainfall intensities evolve during a storm over a watershed. Hydraulic travel time provides an additional lead-time factor for locations downstream. The travel time of a flood wave can range from a few minutes immediately downstream of the FBA to over a half hour along Boulder Creek through the City of Boulder. Larger floods travel faster due to the hydraulic characteristics of overland and channel flow through the natural drainage network, which is taken into consideration by the model.

Radar and rain gauge data are combined to produce what is known as quantitative precipitation estimates (QPE). By contrast, future rainfall is termed quantitative precipitation forecasts (QPF) and was tested in 2012 for the FBA and is planned for continued use for real time operations in 2013. Forecast rainfall is based on projecting the path and intensity of storm cells from successive radar scans, the calculated forecast storm motion offers advanced notice of when and where flash flooding may be expected. An analysis recently completed shows that additional lead-times of approximately 40 minutes downstream of the FBA is possible by using a combination of QPE plus QPF.

These findings suggest that predicting flash floods prior to the onset of heavy rainfall holds great promise for residents and businesses downstream of the FBA. As forecasters continue to gain experience and confidence with using radar-based QPF as input for real-time hydrologic models, emergency managers, first responders, and those in harm's way will be provided with greater lead-times in which they may take the necessary actions to protect lives and property from flash floods.

NHWC Merchandise Available Through CafePress

NHWC has partnered with CafePress to offer merchandise with the NHWC logo. Below is a sample of the types of merchandise available. Please Visit http://www.cafepress.com/nhwc to see the entire selection.

Council Currents

Glenn Austin, NHWC Executive Director - executivedirector@hydrologicwarning.org

Has the NHWC helped you perform your job, expand your business, or keep your community safe this year? That's been our goal and we hope the answer is yes.

As 2012 comes to a close I want to say thanks to all of you who have contributed to our success. Whether you've contributed to our newsletter, workshops, webinar, helping to plan next year's conference or contributed otherwise, we're very grateful. Without your help, we wouldn't be here. Thanks for keeping your membership current with the Council. Your financial support is critically important.

I look forward to 2013 as our organization and services continue to expand to meet the growing needs of the hydrologic warning community. Please let me know if you ever have a comment or suggestion for the Council.

Happy Holidays!

NHWC 10th Biennial Training Conference and Exposition

FIRST COAST
LASTING PARTNERSHIPS
NHWC 2013 CONFERENCE
PONTE VEDRA, FLORIDA

Don't forget to mark your calendar to attend. Visit the **2013 Training Conference webpage**, your one-stop location for conference information.

Book Rooms

Conference Registration

Call for Abstracts Deadline Extended

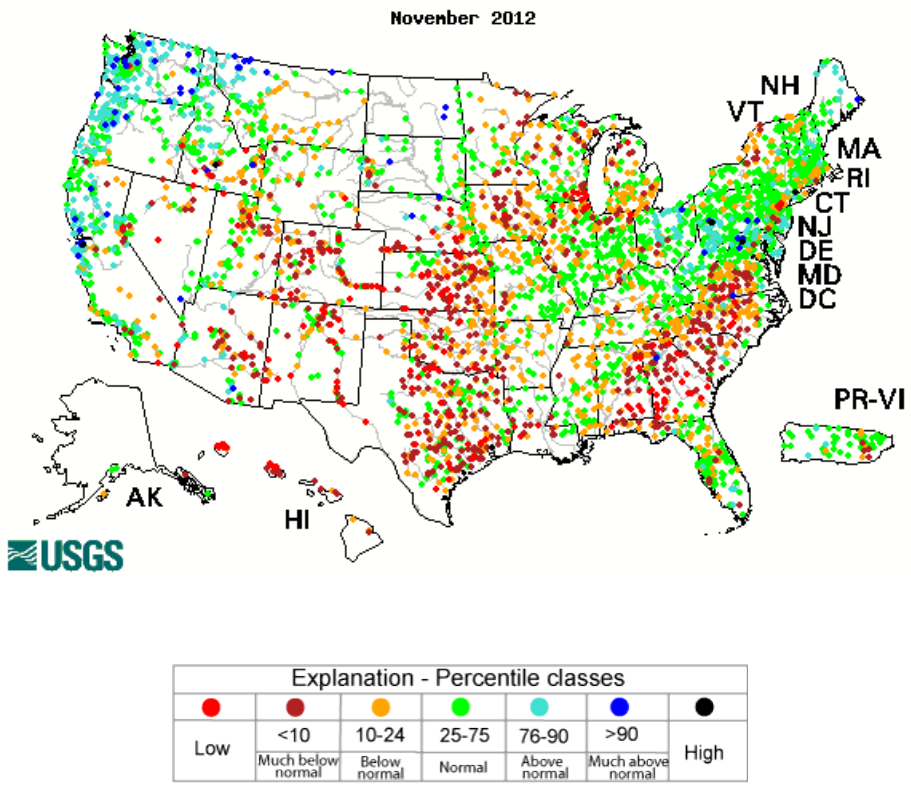
Presentation and poster abstracts are now being accepted for the NHWC 2013 Conference.

Please visit the abstract **web page** for submission guidelines or

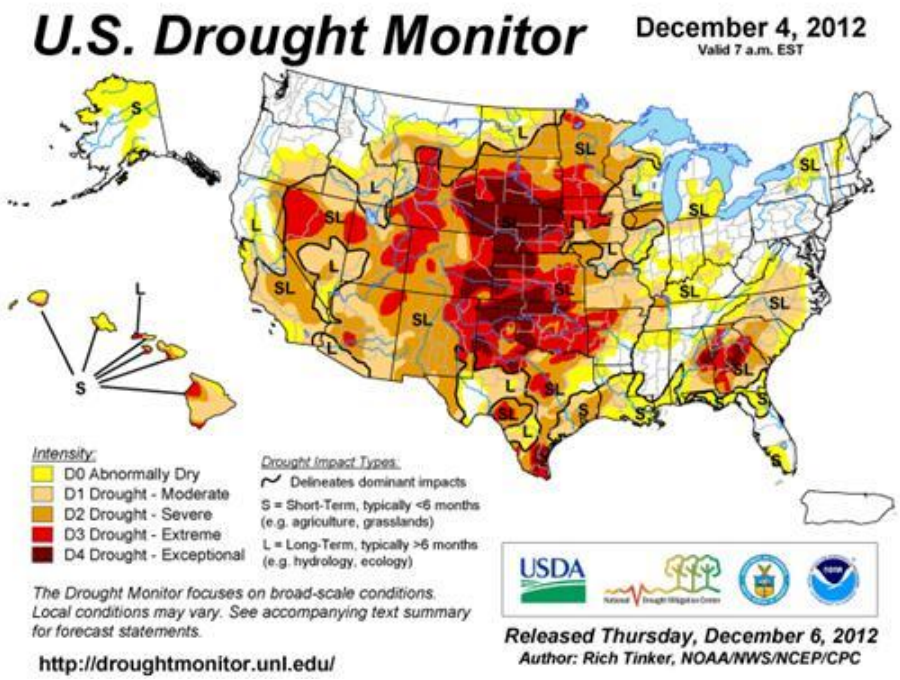
Download the **2013 Call for Abstracts flyer** in PDF format.

Abstracts are due January 31, 2013.

Hydrologic Conditions in the United States
Through November, 2012



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 on Data Collection

NHWC is requesting articles that focus on practices, technologies and tools used to gather and disseminate real-time hydro-meteorological data.

Please consider writing an article that highlights state of the art practices of real-time data collection and dissemination.
Submit your article to:

editor@hydrologicwarning.org

January 1st 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 - Data Collection
Feb - Hydrology
Mar - Hazard Communication & Public Awareness
Apr - Modeling/Analysis

NHWC Calendar

June 3-6, 2013 - NHWC 2013 Training Conference & Exposition, Ponte Vedra, Florida

General Interest Calendar

January 6-10, 2013 - American Meteorological Society 93rd Annual Meeting, Austin, Texas

January 14, 2013 - USGS Flood Frequency Analysis Workshop, Sacramento, California.

February 27-28, 2013 - ASDSO Technical Seminar on Emergency Action Planning for Dam Safety, Kansas City, MO

March 25-28, 2013 - 2013 National Hurricane Conference, New Orleans, LA

June 9-14, 2013 - Association of State Floodplain Managers 2013 Conference, Hartford Connecticut

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

Parting Shot

New ALERT station installed in southern New Mexico December 4, 2012.

Photo by Tyler Azeltine, JE Fuller/Hydrology & Geomorphology, Inc.