The NHWC Transmission

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Corps Water Management System for the Alabama-Coosa-Tallapoosa River System

A Comprehensive and Integrative Tool for the Water Management Toolbox

Kayson Shurtz, WEST Consultants, Inc.

The Corps Water Management System (CWMS) is a comprehensive modeling software package that is used to acquire forecasted and real-time data feeds that are then input into various models which work together to provide critical information for water managers. Prior to the implementation of CWMS for the Alabama-Coosa-Tallapoosa (ACT) River systems of the Mobile District, basin managers were using spreadsheets to assist them in determining how the reservoirs would be operated.

CWMS is a promising new tool in the water management toolbox. It is a comprehensive tool able to quickly convert large data inputs into visual outputs of value for reservoir operations decision-making. CWMS allows for evaluation of various forecasted rainfall totals as well as any number of reservoir operation alternatives. Water managers can then use the results of the CWMS model runs to more effectively achieve their water management goals.

WEST Consultants, Inc. (WEST) worked under a contract with the U.S. Army Corps of Engineers (USACE) Modeling, Mapping & Consequences (MMC) to assist the (USACE) Mobile District (the District) to put together a CWMS model for the ACT basin. This effort was completed to increase flood forecasting capabilities and to provide additional tools and support to water management personnel in the operation of the large and complex ACT river/reservoir system.

The ACT watershed requires collaboration and communication since reservoirs within the system are operated by separate entities. Within the ACT system the USACE operates two reservoirs on the upper portion of the watershed and three reservoirs on the downstream end of the watershed. Alabama Power Company (APC) operates eleven reservoirs in the middle of the basin. In short, both parties are dependent on each other since their operations directly affect one another.

WEST, the District, and APC worked together as a team to develop and calibrate the following models for incorporation into CWMS: HEC-HMS, HEC-ResSim, HEC-RAS, and HEC-FIA. The HMS model takes forecasted precipitation and calculates runoff hydrographs. These hydrographs are fed into ResSim which computes reservoir releases and pool elevations based on a set of user-defined rules. This information is then fed into the RAS model which computes stages and inundation depths. The inundation values are used as input to the FIA model which computes potential economic damages.

The ACT watershed is approximately 22,800 sq. miles and includes area from three different states. Data collection proved to be a challenging ➡

process. A comprehensive model of this magnitude requires many different types of data and these data types are often provided by various sources.

Historical storm events were selected for calibrating the models to improve their accuracy. Since the calibration phase of the project is dependent on these data, it is critical to make sure the initial data collection is thorough and complete so the calibration phase can go smoothly. Since the watershed spans two different time zones this also presented a challenge to keep everything straight and make sure data time stamps were all being shifted correctly. Collecting the historical data manually highlighted the utility of setting up the CWMS oracle database which consolidates collected data and automatically applies time adjustments.

The end result was a comprehensive flow forecast tool that can provide important and timely details to water managers including forecasted inflow hydrographs, projected river stages, inundation mapping, and potential damages of the resulting inundation based on various precipitation forecasts and reservoir operation alternatives.

Looking Upstream at the USACE's Allatoona Dam

In a sense, the CWMS model allows water managers to look out into the future to evaluate various scenarios and operate their system to minimize risk. In terms of flood risk management, lead time is one of the most valuable commodities. The CWMS model provides that increased amount of lead time which can lead to reduced flood damages and greater protection to all who live within the basin.

Understanding and Preparing for Coastal Storm Impacts

Observing Overland Surge, Wave, and Tide Hydrodynamics

Ronald Busciolano, Richard Verdi, John Fulton and Marie Peppler, USGS

Scientific information, when reliably obtained and wisely applied, can strengthen our efforts to build resilient coastal communities before storms strike, and guide our response and recovery strategies after landfall. Past storms, such as Hurricane Sandy, have shown that energy from storm surge and waves is a primary driver of coastal-community destruction and dramatic change in the coastal environment. The landward extent of the surge (storm tide) transports saline water, sediment, and debris beyond the normal range of ocean waters. Documenting the height, extent, and timing of overland storm tide and wave dynamics across natural and man-made landscapes, is critical for improved storm-surge modeling for floodplain mapping and real-time forecasting. This leads to better planning, more effective early warning of storm-driven flooding, and strengthening of coastal resilience.

The U.S. Geological Survey (USGS) has traditionally provided critical information on near-shore storm hydrodynamics during hurricanes and nor'easter storms via a real-time network of tide gages focused on near-shore waters that supplement tide networks operated by other federal agencies. Data from temporary sensors and high-water marks obtained by the USGS in cooperation with the Federal Emergency Management Agency, the U.S. Army Corps of Engineers, and various state agencies have provided post-storm documentation of coastal floods. Neither approach provided the spatial or timely information needed for emergency operations or improvements in storm-tide and wave modeling prediction.

Following Hurricane Sandy, the USGS began construction of an overland Surge, Wave, and Tide Hydrodynamics (SWaTH) Network along the Northeastern Atlantic Coast from North Carolina to Maine (Figure 1). This network, developed collaboratively with numerous partners, features the integration of long-term tide gage networks, with real-time rapid-deployment gages (RDG) and mobile storm-tide sensors (STS). An element of the comprehensive strategy of SWaTH ensures locations for most RDGs and STSs have been pre-surveyed to the North American Vertical Datum of 1988 (NAVD 88) and equipped with receiving brackets. This permits rapid deployment and

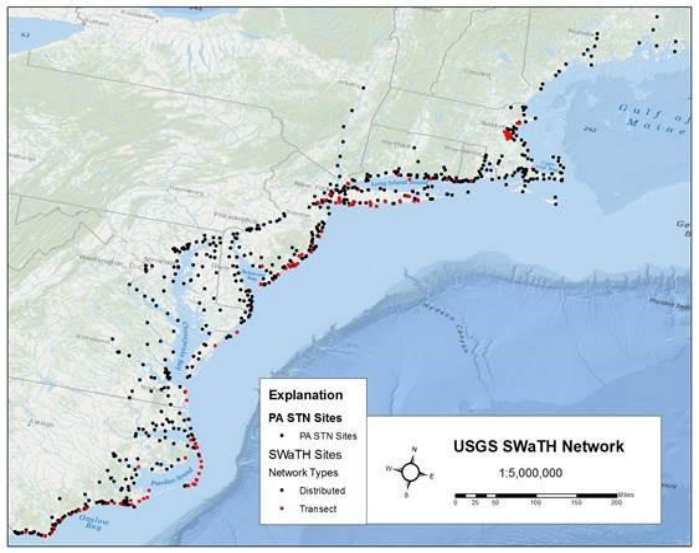


Figure 1 - Map showing USGS SWaTH Network sites including long-term, real-time tide gages, tidally affected stream gages, rapid-deployment gages, and temporary storm-tide/wave sensors. Black symbols indicate distributed sensor/gage locations; red symbols indicate transect

recovery of instrumentation and data dissemination in the hours and days immediately after an event.

SWaTH consists of 71 existing and new flood-hardened, long-term, real-time tide gages, 61 RDGs, and up to 555 temporary STS locations. Locations in the SWaTH network were selected according to three criteria: (1) a distributed array of stations representing the range of landscape types and infrastructure subject to surge and wave forces, (2) along transects from the coastline through the inland resource of concern (e.g. a wetland or coastal community), and (3) at existing tide and river monitoring stations where new data can be integrated with long-term records.

Transects oriented perpendicular to the coastline will provide data for the analysis of wave height, frequency, and devolution as functions of water depth and distance inland. Associated meteorological data, supplemental high-water marks, coastal river flow gages, coastal current monitoring, and other hydrologic data will provide ancillary information for interpreting changes in coastal hydrology and vulnerability of coastal ecosystems and communities in response to storm damage.

Timely and easily accessible data are critical to emergency agencies and local emergency responders. SWaTH deliverables will include a web application portal to display time series information for water elevation, wave height and frequency, and select meteorological data. The portal will enhance the data availability from historical USGS deployments and increase the timeliness of data processing for future storm events. These data will be immediately available to emergency managers via a mapping application and direct web services at http://water.usgs.gov/floods/FEV/.

Call for Abstracts

The due date for the call for abstracts is just around the next turn.

Here are instructions for submitting your abstract.

Abstracts and biographies must be submitted by February 13, 2015 online at www.hydrologicwarning.org/abstracts

Authors will be notified of their acceptance by the NHWC agenda committee no later than 3 weeks after the close date. A concise biography of all authors must be provided, including job title, employer, phone number, mail, and e-mail address of each author. Both short and long-format presentations are being sought:

Short presentations – 30 minutes, including a Q&A period

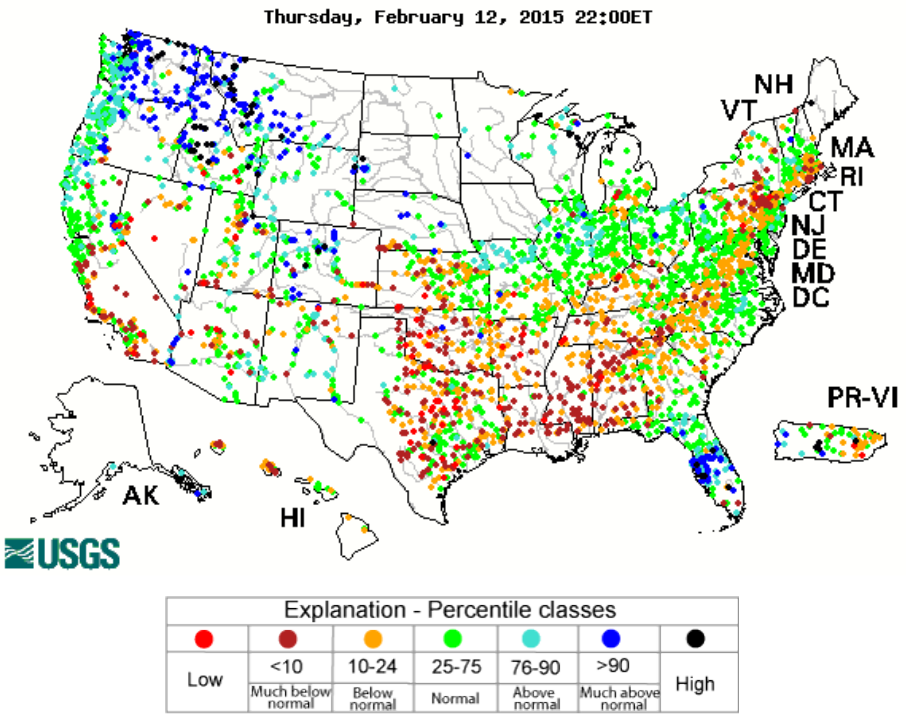
Long presentations – 90-minute workshop-style presentations, ideal for extended training, multi-speaker programs on a common theme, or panel-style presentations

The length of presentation should be noted on the abstract submittal. All presentations must focus on professional content and not include specific promotion of a product or company.

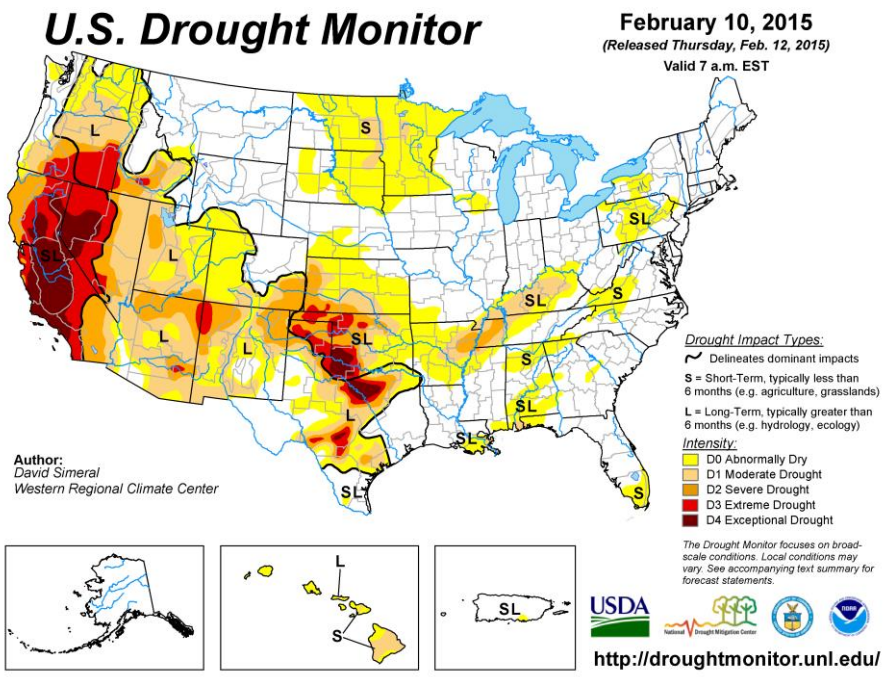
Presentations should be delivered via CD or USB drive at time of check-in at the registration desk.

Preparation of a complete paper is highly encouraged but is not a requirement for presenting at the conference. By submitting an abstract for a presentation or paper, authors agree to its distribution at the conference and to subsequent reproduction in conference proceedings, newsletters, and on the NHWC website.

Hydrologic Conditions in the United States
Through February 12, 2015



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



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

March Newsletter Articles Focus:

Hydrology

The NHWC is requesting articles that focus on hydrology - the science behind the work we do.

Please consider preparing a short article about new methods, research, or discoveries in hydrology or a recent significant hydrologic event.

Submit your article to:

editor@hydrologicwarning.org

March 6th is the deadline for inclusion in the March issue.

Future Newsletter Articles Focus

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

Mar - Hydrology
Apr - Hazard Communication & Public Awareness
May - Modeling/Analysis
Jun - Data Collection

Membership Renewal

It's not too late 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

April 19-23, 2015 - SEDHYD 2015 - Joint 10th Federal Interagency Sedimentation Conference and 5th Federal Interagency Hydrologic Modeling Conference, Reno, Nevada

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

Afton Weather Station 6/18/2014

Afton Weather Station near Las Cruces, New Mexico – the first ALERT2 station in Doña Ana County.

Photo by Scott Bores, OneRain