



Perspectives on the National Water Model

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The National Water Model is a dynamic and fast-moving initiative with a wide variety of contributors intended to serve an even wider audience, from fellow scientists to emergency managers to water recreation. For perspective on the depth and breadth of the model and its potential impact, a variety of groups from federal to local government, watershed authorities and industry were asked to share their involvement and thoughts on future use of the National Water Model forecasts.

U.S. Geological Survey

The National Water Model (NWM) is a multi-agency collaboration toward a modeling platform that leverages USGS observations, realizing value from streamflow monitoring that up until now has not been possible. Development of the NWM was achieved with support from the Integrated Water Resources Science and Services (IWRSS) federal partnership, with its aim to improve response to nationally significant water issues. Since its formation in 2011, IWRSS partners (USGS, NOAA, USACE) have improved

their individual agency's practices, data systems and information flows to enable next generation water prediction with the NWM as a focus. Participating agencies have committed to improved data interoperability and to work towards a common framework for hydrologic modeling. Taken together as a distributed system supported by many providers, the NWM incorporates more real-time streamflow observations and landscape information than previous modeling frameworks. It produces flow estimates based on a common hydrography (NHD+)

and serves as a basis for continued innovation by scientists and engineers in government and academia. Looking to the future, the NWM is a collaborative mechanism through which the USGS Water Mission Area's data-product dissemination and modeling-method integration efforts are helping to answer the increasingly pressing and complex water resource questions facing our nation.

U.S. Department of Agriculture

USDA scientists are working with the National Water Model (NWM) support scientists to improve forecasts and verify modeled flows. Collaborative projects with USDA's Agricultural Research Service involve using remotely-sensed ET and soil moisture products to enhance the NWM real-time analysis, and improving the representation of ephemeral channel transmission losses in the NWM. As the NWM moves forward and new datasets and tools are provisioned, USDA may find uses for incorporating information into monitoring and management activities. For example, our operational drought monitoring activities, such as the *U.S. Drought Monitor*, and our nationwide framework for evaluating the hydrologic functioning of watersheds on National Forests and Grasslands managed by

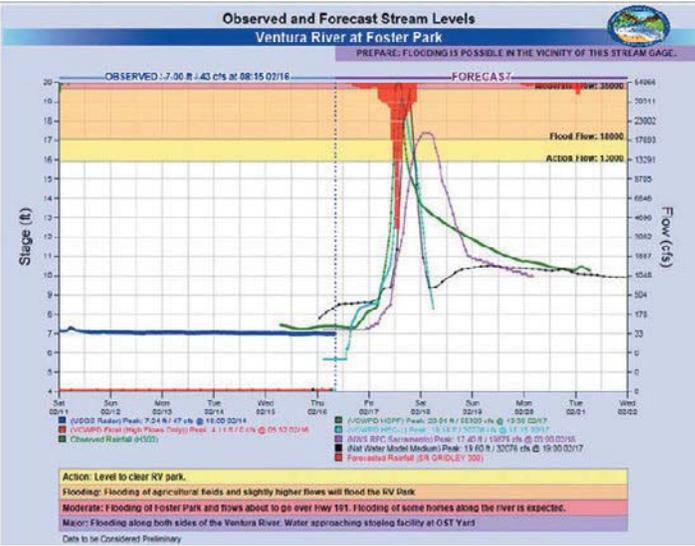


Figure 1: The Ventura County VCAHPS system showing the NWM forecast along with additional forecasts.

the Forest Service, could be informed by real-time, hind-casted and forecasted hydrologic condition across the U.S. USDA scientists and programs look forward to coordinating with the National Drought Mitigation Center (NDMC) and its partners in NOAA to find new uses for the National Water Model.

San Antonio River Authority

The San Antonio River Authority previously developed a flood forecasting application that uses NEXRAD rainfall precipitation estimates to drive hydrology and hydraulic models in near-real time, then map the floodplain and provide alerts at selected locations every 15-20 minutes. The application is part of the Authority’s effort to provide enhanced flash flood situational awareness to local officials and emergency responders and supplement the forecast information the national weather models currently provide. We view the National Water Model (NWM) as the next generation river and stream forecasting platform that will alleviate the need for regional agencies/ authorities to take on the flood forecasting role. As the NWM technology matures and accuracy improves, we see potential for high-resolution water quality and environmental flow modeling, as well as a tool to evaluate regional flow patterns that impact the bays and estuaries of the San Antonio Bay.

Ventura County Watershed Protection District

The VCWPD is using the National Water Model as an additional ensemble

forecast to the existing Ventura County Advance Hydrologic Prediction System (VCAHPS) and displays it along with other available forecast models. Using the programming hooks provided by NOAA, VCWPD can access underlying forecast data for their National Water Model website. VCWPD uses this interface to pull data for specific locations in Ventura County. The NWM forecasted flows can then be plotted on existing displays available through

the VCAHPS along with other forecasts utilized by the District. A second Decision Support System (figure 1) was developed that shows all existing bridges in Ventura County enabling comparison of the capacity for water conveyance of the bridge versus the forecasted maximum from the NWM. The display changes color for bridges that have a potential for overtopping based on the NWM prediction. In the future, Ventura County has plans to evaluate the NWM and provide feedback to NOAA on local knowledge about channel geometry, roughness and other channel parameters used in the model.

KISTERS

KISTERS has developed a demonstration project using NWM forecasts for flood impacts at stream and street level. NWM forecasts from NWS are ingested into KISTERS’ big data technology stack, which compares these forecasts to federal, state and local stream gage results. KISTERS utilizes rating curves computed using the HAND (Height Above Nearest Drainage) method by the University of Texas, Austin to convert forecasted flow to water level. Using open standard web services, KISTERS supplies forecasted flow and precipitation, computed water level, and evaluations of forecast data versus actual gage measurements, to Esri for geoprocessing and the creation of inundation maps and dashboards. Subsequently, each stream reach and HAND elevation are associated with

emergency response address points to provide actionable information products. Emergency management professionals can easily view approximate flood levels and address inundation using NWM 18-hour (short-term) and 10-day (mid-term) forecasts. The NWM Web Portal and Data Viewer (figure 2) created by KISTERS allows users to view and compare all data supplied by the web services for complete transparency. ■

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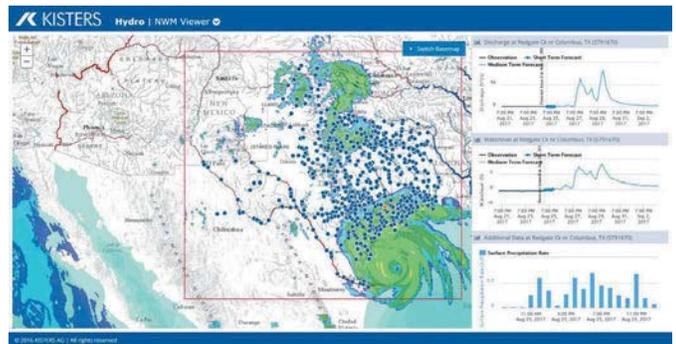


Figure 2: KISTERS NWM Viewer showing historic rainfall of hurricane Harvey approaching the Texas coast, and a forecasted runoff hydrograph from the National Water Model, water level, and precipitation rate.