



The NHWC Transmission

June 2015

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Tornado Chaser Heads Offshore to Record Storm Surges

Christina Iarossi, SonTek

Filmmaker and renowned tornado chaser Sean Casey is looking out to sea for his next exploration of nature's power—hurricanes and the storm surges they create.

Casey is putting the finishing touches on a specially reinforced 29-foot boat that will carry him, a researcher, a captain and a crewmate to the leading edge of hurricanes for a close-up look at the ferocity of these devastating storms. As the storm approaches landfall, Casey and his crew will place high-tech instruments that provide details on the height, velocity, and wave energy delivered by the surge of water stirred up by hurricanes in the Caribbean and Gulf of Mexico. They'll also be filming the powerful storms for National Geographic.



The Big, Big Screen

Casey blew into the public eye with his jaw-dropping filmmaking and deep knowledge of storm systems on the Discovery Channel's *Storm Chasers* in 2007, and followed up his small-screen work with the 2011 release of full-length IMAX feature *Tornado Alley*. *Tornado Alley* was funded in part by a grant from the National Science Foundation.

During the production of *Tornado Alley*, Casey designed the *TIV 2*, his second *Tornado Intercept Vehicle*. The heavily armored van acted as a shooting platform and data gathering base, and allowed Casey to position portable meteorological instruments in the paths of oncoming twisters. It also served as inspiration for the hurricane project.

Casey's new boat, the SSV, or *Storm Surge Vessel*, is 29 feet (8.8 meters) long and 8.5 feet (2.6 meters) at the beam. Its cabin is formed of a single piece of 1/8-inch aluminum for durability and water-tightness, and its windows are formed of half-inch polycarbonate. A pair of HJ241 Hamilton jets mounted to twin Chevy V-8 small block marine engines will propel the 9,000 pound displacement craft in as little as 8 inches (20 cm) of water.

"It's a ruggedized boat, so when things do get bad, it will be very difficult to sink," says Casey.

Acoustic Doppler Profiling: A Slice of the Action

Since Hurricane Rita blew through the Gulf of Mexico in 2005, scientists have used depth sensors to record the magnitude of storm surges. Those early readings were taken with pressure sensors, or strain

gauges. Researchers are also tapping into a steady stream of sea surface data from satellite mounted radar altimeters.

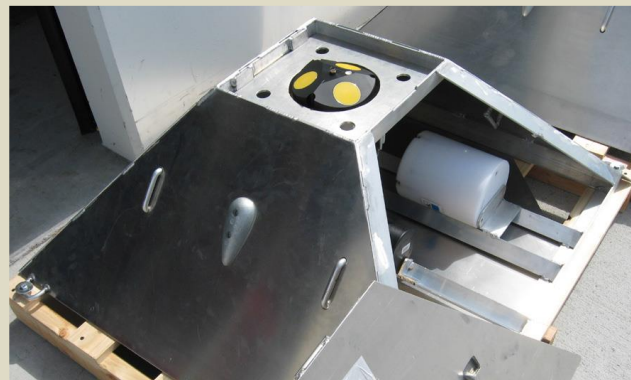
Casey is equipping his team with acoustic Doppler profiling systems, or ADPs, from SonTek, which capture detailed information not just on the height of the surge, but on the direction and velocity of the water throughout the surge's profile.

Alexandru Sheremet, a University of Florida researcher who is serving as Casey's technical advisor, will use the surge data to correspond to studies of storm impacts on buildings, and to validate surge models.

He recommended taking aboard a SonTek Argonaut-XR ADP, an acoustic Doppler profiler capable of collecting and storing data samples with 10 acoustic velocity cells and a dynamic AutoTide feature that automatically adjusts the size of the velocity measurement cell based on fluctuations in water depth. He also suggested Casey take on a SonTek RiverSurveyor M9, a multifrequency ADP mounted on a floating hydroboard. Towed across the water's surface, the RiverSurveyor profiles direction and velocity with a ping rate of up to 70 impulses per minute.

"When we deploy instruments in a storm surge, we want to gather data on how fast the flow is, what is the vertical structure, what kind of waves we have on top of the storm surge,"

Sheremet says. "Acoustics is the technology that allowed us to use the relatively cheap, very efficient instruments to measure current velocity. They allow you to gather data remotely and measure velocity at many levels. You get an entire profile.



Waiting for the Big One

Kevin Labbe, the SonTek application specialist training Casey on operating the ADPs, points out that gathering acoustic data in the water will provide greater detail and greater accuracy than standard surge detection instruments.

Casey says his goal is to deploy the SSV in areas not already served by other surge monitoring projects. "My goal is primarily to take instruments to places they haven't been able to reach—remote beaches, swampland, barrier islands." 🌊





26th ALERT Users Group

Training Symposium & Preparedness Workshops

April 18-22, 2016

Tenaya Lodge at Yosemite

Fish Camp, CA

<http://www.alertsystems.org>

California Groundwater Management Program Relies on Innovative Technologies to Serve 4 Million

Jennifer Eyden, In-Situ, Inc.

Due to increasing water demands, decreasing supplies of imported water, and recurring drought conditions, state and local governments are expanding or developing groundwater replenishment and recharge systems. These systems divert highly treated wastewater, currently discharged into the ocean or local surface waters, into natural storage areas. Recycled waters, once purified, are injected into seawater intrusion barriers, piped to recharge areas, or discharged to surface waters and eventually diverted to groundwater basins. Water management agencies aim to meet future water demands, protect against droughts, and preserve high-quality groundwater through innovative, cost-effective, and environmentally sensitive basin management practices.



The existing and future limitations of water resources in Southern California have prompted more efficient management of water supplies. When over four million people in 43 cities rely on you to deliver high-quality water, you need a robust water quality and water level monitoring program. The [Water Replenishment District of Southern California](#) (WRD) has just that. Founded in 1959, the WRD manages groundwater replenishment and groundwater quality activities in cities that overlie the Central and West Coast Basins (CBWCB) of southern Los Angeles County (see map above). The 420- square-mile service area uses about 250,000 acre-feet of groundwater per year, and the Central and West Coast Basins supply about 40 percent of the water used in that region. As the population continues to increase, and extended drought conditions exacerbate

reliance on dwindling imported and storm water for groundwater recharge, it becomes even more important to maximize the use of recycled water sources available to the WRD.

Over 300 Wells at 58 Locations

To meet requirements of the California Water Code Section 60300, WRD hydrogeologists and engineers track groundwater levels from a network of specialized monitoring wells and from groundwater producer's production wells. Currently, the network consists of approximately 325 WRD and USGS-installed monitoring wells at 58 locations throughout the District, which supply water level and water quality data.

Currently, over 100 wells are equipped with [In-Situ® Level TROLL® 500](#) instruments that accurately measure and log water level and temperature data every six hours. The primary purpose of water level monitoring is to meet statutory responsibility to maintain groundwater availability. These instruments reduce trips to the field, and enhance the WRD's monitoring program and ability to better manage vital water resources through severe drought conditions, by allowing for more measurements for increased data resolution.

60,000 Sampling Data Points Every Year

During biannual sampling events, the WRD typically uses traditional water quality sondes or handheld instruments to collect representative groundwater samples. Over 100 water quality constituents are analyzed to produce nearly 60,000 individual data points. All these data add up to a comprehensive picture that informs the WRD about water quality in the basins and trends that may require policy changes. 🌊

In 2013 the WRD began operating two SMARTROLL Low-Flow Systems for on-going low-flow water quality data collection.



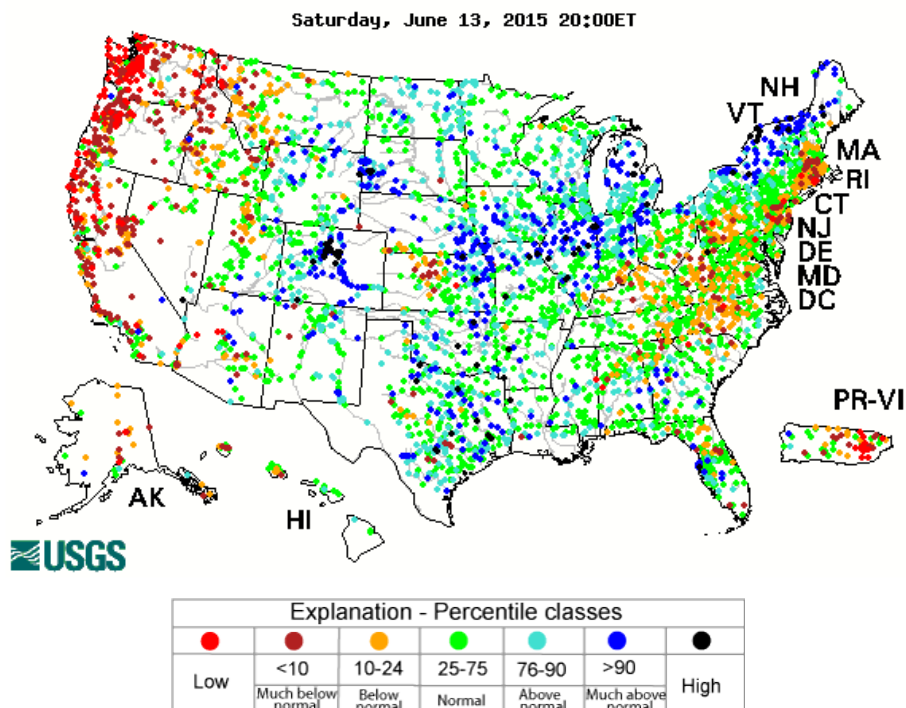
Last-Minute NHWC Conference Announcements

CFM Continuing Education Credits - ASFPM will offer 12 core continuing education credits to Certified Floodplain Managers attending the Conference.

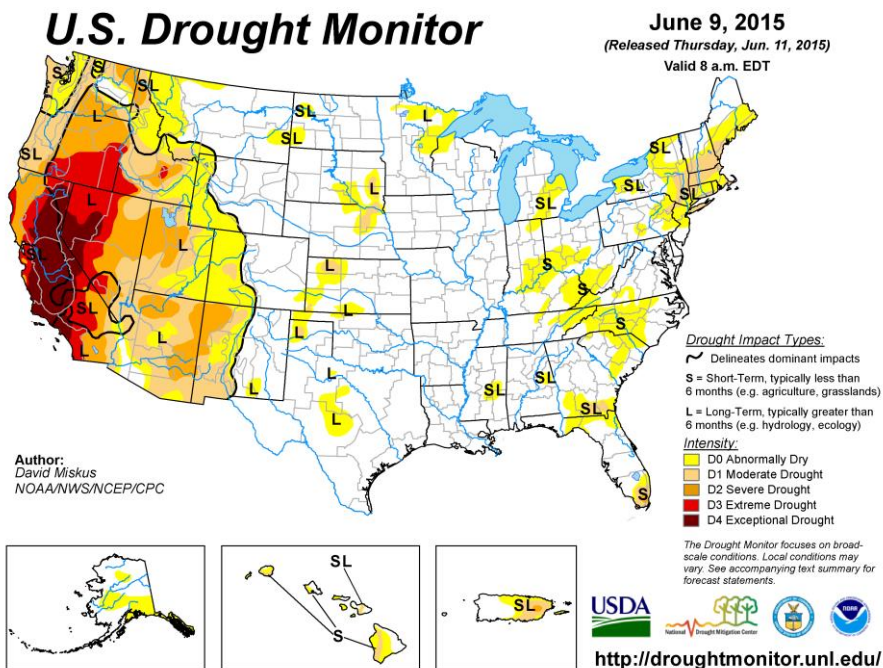
CEM/AEM Professional Contribution - The International Association of Emergency Managers has approved 18 hours of conference attendance under the CEM/AEM professional contribution B) Professional Attendance for Emergency Managers attending the June 15-18, 2015 NHWC Conference.

Houston Flooding Update - A late addition to the agenda is a presentation by Steve Fitzgerald of Harris County Flood Control District on the recent devastating flooding in the Houston area.

Hydrologic Conditions in the United States Through June 13, 2015



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



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

July 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

July 1st is the deadline for inclusion in the July issue.

Future Newsletter Articles Focus

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

Jul - Hydrology

Aug - Hazard

**Communication &
Public Awareness**

Sep - Modeling/Analysis

Oct - Data Collection

Membership Renewal

It's never too late to become an NHWC Member. Click [here](#) to join/renew your membership.

NHWC Calendar



June 15-18, 2015 - [NHWC 2015 Training Conference & Exposition](#), Indianapolis, Indiana

November 4-5, 2015 - NHWC Advanced Flood Warning Workshop, Albany, New York

General Interest Calendar

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

Magma Channel at Central Arizona Project Canal Over Shoot



This new Pinal County, Arizona ALERT precipitation/stream station was installed on June 10th, 2015. Use of a High Sierra Electronics, Inc. pole-mount traffic cabinet type housing streamlined the BLM right-of-way permitting process by eliminating the need for ground disturbance.



Photo by Brian Iserman, JE Fuller/Hydrology & Geomorphology, Inc.

National Hydrologic Warning Council

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

<http://www.hydrologicwarning.org>