



# The NHWC Transmission

Fall 2020

## CONTENTS

Debris Flow Hazards .....	1
NHWC Conference Update ....	3
Training Reboot .....	4
US Hydrologic Conditions .....	5
Calendar of Events .....	6
Call for Articles .....	6

Click on hyperlinks located throughout this newsletter for more information.

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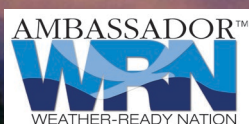
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## Assessing Debris Flow Hazards in Ouray County, Colorado with USACE HEC-HMS and HEC-RAS

Kellie Jemes and Brian Haines, U.S. Army Corps of Engineers

Corbett Creek is in scenic Ouray County, Colorado. The creek is part of a small and steep mountain drainage (2.9 square miles) that passes through a slot canyon just upstream of a housing development and a culvert where County Road (CR)-17 crosses the creek (Figure 1). The upper portion of the watershed contains sediment that is easily transported during runoff events, resulting in frequent debris flows. On Corbett Creek, the debris flows that occur are known to carry rocks the size of small vehicles and thousands of cubic yards of mud, rocks, and trees. These events have damaged the culvert and CR-17 several times over the past ten years resulting in road closures, repairs, and excessive maintenance (Figure 2). Road closures on CR-17 are problematic, as the road serves as the secondary access route for the City of Ouray. To develop and implement a long-lasting solution for this problem area, Ouray County has partnered with the U.S. Army Corps of Engineers (USACE) under the Floodplain Management Services Program.

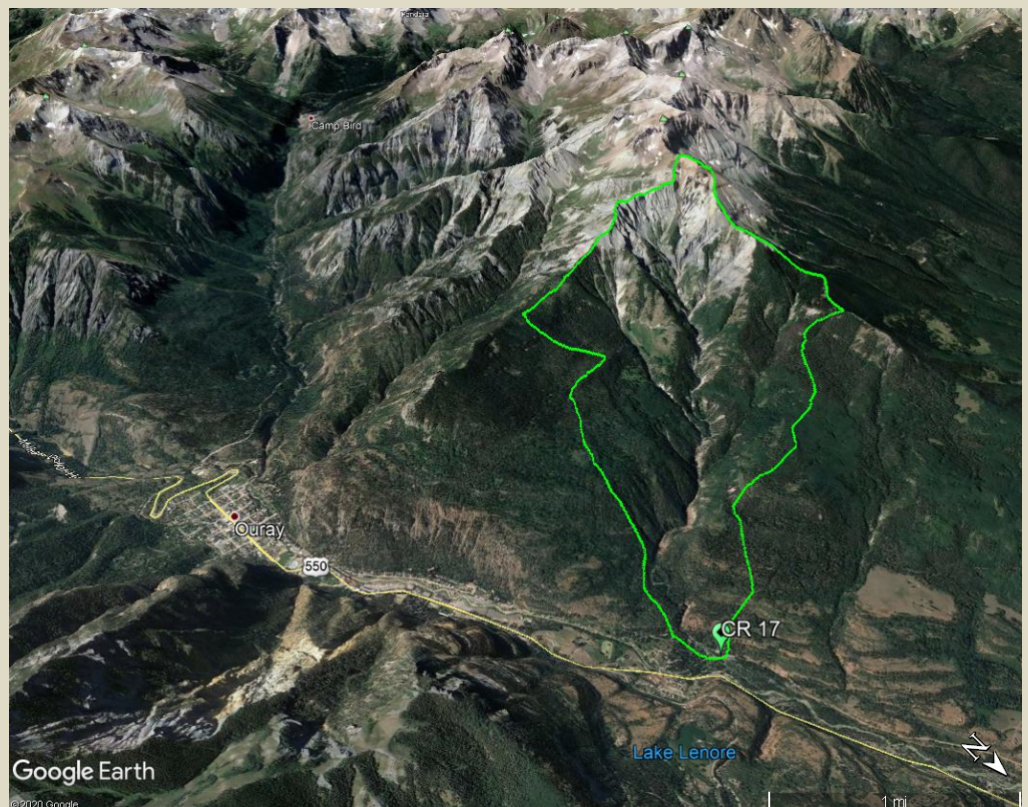


Figure 1. Corbett Creek watershed (courtesy of Brian Haines).





Figure 2. Resulting debris after September 2012 event (courtesy of Bill Coughlin).

The USACE Hydrologic Engineering Center (HEC) and Engineer Research and Development Center (ERDC) are in the process of studying debris flows and developing methods to model them. Debris flows do not behave in the same way as clear-water flood flows. Water is considered a Newtonian fluid and behaves according to physics associated with Newtonian fluids. When the sediment concentration in water is greater than approximately 10%, the fluid begins to behave as a Non-Newtonian fluid. The Non-Newtonian behavior of debris flows causes them to travel at different velocities and depths and with more momentum than clear-water flows. This behavior causes the debris flow to have a different inundation area and/or path of destruction when compared to a clear-water flow. A feature was recently added to the HEC-River Analysis System (HEC-RAS) hydraulic modeling software to allow for modeling of Non-Newtonian fluids (i.e. debris flows). Additionally, the ERDC is in the process of creating a library of debris flow data (DebrisLib) to inform users of the input parameters required for debris flow modeling.

To model debris flows on Corbett Creek, the total sediment load produced by the upper watershed was estimated using the HEC-Hydrologic Modeling System (HEC-HMS) hydrologic modeling software. The Modified Universal Soil Loss Equation (MUSLE) erosion method in HEC-HMS was used. The parameters for MUSLE were adjusted upward to reflect the extreme conditions of each sub-basin. The total sediment load was applied to the outflow

hydrograph from the upper sub-basins to determine the input sediment concentration for the HEC-RAS debris flow model. The debris flow model results are compared to the original clear-water (no debris) results and show an increase in inundation extents and depths (Figure 3). These results are being used to assess the existing conditions, evaluate solutions for the CR-17 creek crossing, and estimate the magnitude and frequency of future debris flow events that may occur in the Corbett Creek watershed.

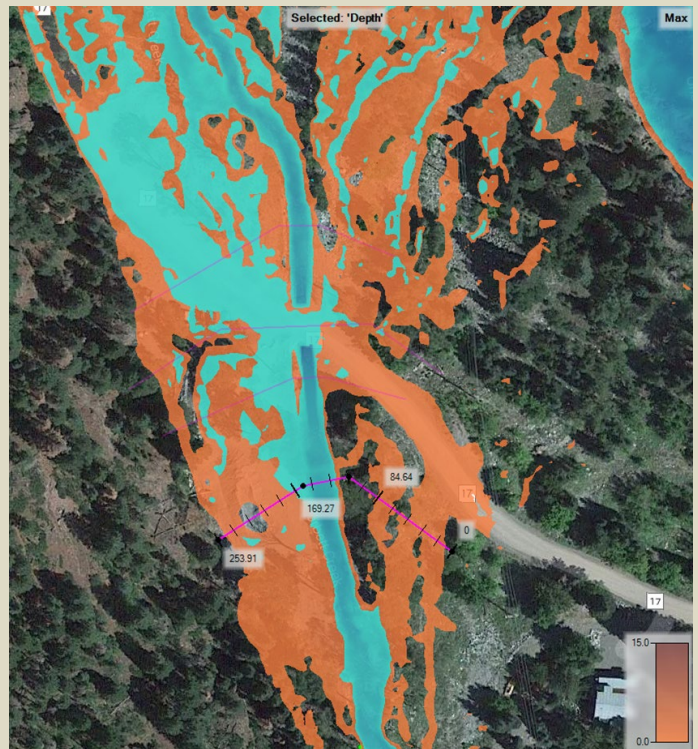


Figure 3. Comparison of clear-water (blue) and debris flow (orange) model results. For the same flow event, the debris flow model shows increased inundation extents (courtesy of Brian Haines).

The ability to model debris flows using HEC-RAS provides great value to the Corbett Creek study. However, debris flows are not unique to Ouray County, Colorado and have been observed in other areas with similar steep drainages and burn damage from wildfires. The tools in HEC-HMS and HEC-RAS can be used to inform warning systems using real-time precipitation data, aid in the assessment of flood hazards, and help develop effective mitigation measures in other areas with debris flows. As these tools continue to evolve, they will improve our ability to predict debris flow events and prepare for the potential impacts. 🌊





**NHWC2021**  
*Breckenridge, CO*

## NHWC Conference Update

Drawing upon the results of the survey we put out on September 11, the NHWC Board of Directors and the 2021 Conference Planning Committee have elected to proceed with planning the 14<sup>th</sup> Biennial NHWC Training Conference & Exposition, scheduled for June 21-24, 2021 at Beaver Run Resort in Breckenridge, Colorado. The planning committee is currently re-imagining what our conference will look like in what we hope will be the aftermath of Covid-19. We must balance the desire for educational sessions and networking events with the health, safety, and best interests of attendees, keeping in mind the long-term sustainability of our organization as well. Expect to see changes in the timeline leading up to the conference, the agenda for the week, the fees, and sponsorship or exhibitor options. We are assembling this information as quickly as possible in hopes of getting the Call of Abstracts out and opening registration by October 31.

As I mentioned in my last conference update, summer in Breckenridge is amazing. With the hotel offering group rates on extended shoulder days (five days before and five days after the conference), my family and I plan on making a full week out of it. You should too, as there are lots of hiking, biking, whitewater rafting, fly fishing, live music, and dining options for the whole family. The hotel also has nine hot tubs, two pools, a fitness center, on-site spa, on-site restaurants and bars, and an arcade and indoor miniature golf course. They have added enhanced cleaning and operations protocols, such as masks and health screenings, to help you feel safe during your stay.

Keep an eye on your inbox for the Call for Abstracts, and I look forward to seeing you all at the “Gold Rush at the Great Divide”.

**Brad Heilwagen**, NHWC Conference Chair, Wood Environment & Infrastructure Solutions





## NHWC Pushes Reboot on Training & Professional Development Committee

Brad Heilwagen, NHWC Vice President  
Mark Moore, NHWC Director

The mission of the NHWC is to provide education, training, and standards for the generation, delivery, and use of timely, reliable hydrologic information. With the cancellation of our fall Texas Workshop, the shift of the AUG conference to a virtual platform, and the uncertainty surrounding our 2021 conference due to the ongoing Covid-19 pandemic, the NHWC Board of Directors recognized the need to provide more frequent training and professional development opportunities to members and non-members alike. The Board decided to reform the Training & Professional Development Committee, and put out a request for volunteers to assist with the advancement of our professional development program by planning and executing workshops, webinars, training courses, and other professional development opportunities throughout the year.

Technically a subcommittee of the Executive Programs Committee, the Training & Professional Development Committee was formed in 2010 with the objectives of creating an educational program for operators covering all facets of flood warning, offering opportunities to foster networking amongst flood warning providers, and exploring the viability of certification programs. Although the committee has been inactive for the past few years, the charter remains with defined mission, objectives, and success criteria. The newly reformed committee had our first meeting on September 29 and discussed how to pick up where our predecessors left off and step closer to the defined success criteria. It was decided that our first action would be to poll the members of NHWC to determine which flood warning topics are most important to you right now. Keep an eye on your inbox for the upcoming training and professional development topics survey. We encourage you to respond and let your voice be heard.

On behalf of the NHWC Board of Directors, we would like to thank the following committee members who volunteered to help advance our training and professional development program:

- Josh Herbert, Calcasieu Parish, Louisiana (Committee Chair)
- Beth Parker, Dewitt County, Texas, Drainage District
- Lee von Gynz-Guethle, WEST Consultants
- Sam Utley, Campbell Scientific
- Dr. Waheed Uddin, University of Mississippi
- Melinda Luna, KCI Technologies
- Jordan Hayes, Wood Technical Consulting Solutions

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## NHWC News

### 2020 NHWC Texas Workshop Cancellation

Due to the ongoing COVID-19 pandemic, the NHWC is unable to hold the Texas workshop scheduled for October 21 - 22, 2020 in San Marcos, Texas. We are sorry for this late change in plans but as you know, numerous organizations are dealing with the same issue. We are tentatively looking at October 13-14, 2021 for a new date.

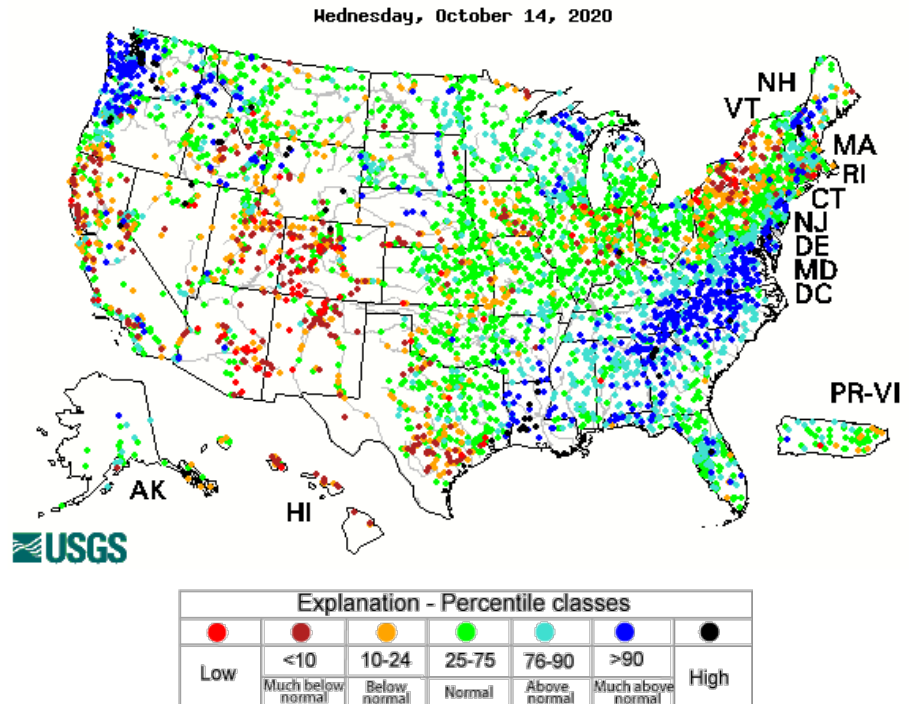
## Headline Links

[German Researchers Measure Rainfall by Studying Radio Waves](#)

[New Guidebooks Help Urban Communities Install Low-Cost Sensors to Reduce Flood Risks](#)

[Reclamation Launches Prize Competition to Improve Streamflow Forecasting](#)

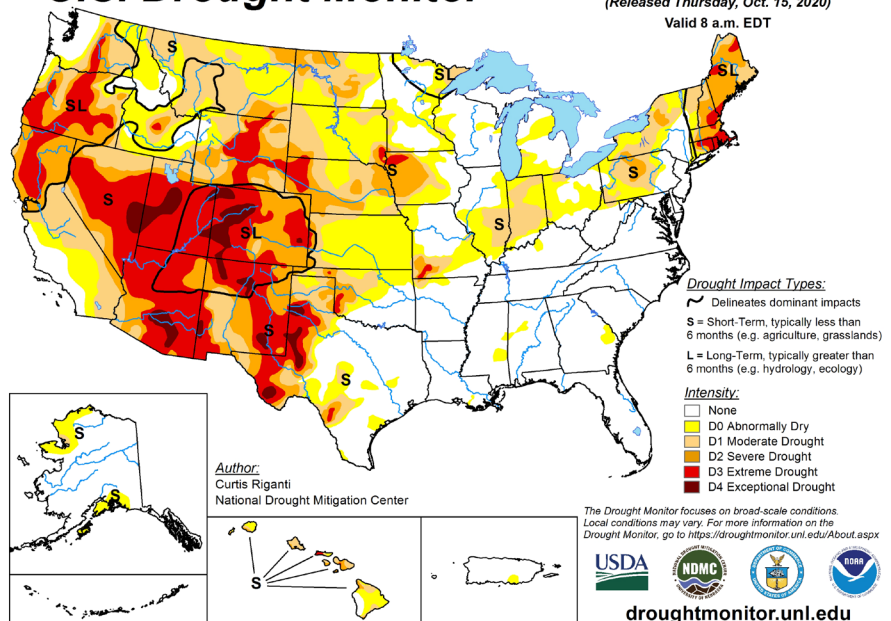
## Hydrologic Conditions in the United States Through October 13, 2020



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

## U.S. Drought Monitor

October 13, 2020  
(Released Thursday, Oct. 15, 2020)  
Valid 8 a.m. EDT



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



## Call for Newsletter Articles:

The NHC is requesting articles that focus on the following topics:

### Data Collection

practices, technologies and tools used to gather and disseminate real-time hydro-meteorological data

### Hazard Communication and Public Awareness

practices, technologies and tools used to get the right real-time data and information to the right people for the right response

### Hydrology

new methods, research, or discoveries in hydrology or a recent significant hydrologic event that helps us understand the science behind the floods

### Modeling & Analysis

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)

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

## NHWC Calendar

June 21-24, 2021 – [NHWC 14th Biennial Training Conference & Exposition](#), Breckenridge, Colorado

## General Interest Calendar

September 21 – December 31, 2020 – [Dam Safety 2020 On-Demand conference](#), Virtual

October 27-29, 2020 – [Arizona Floodplain Management Association Fall 2020 Virtual Conference](#)

May 11-13, 2021 – [American Meteorological Society 13<sup>th</sup> Fire and Forest Meteorology Symposium](#), Palm Springs, California

## Parting Shot Portal, Arizona



The Cochise County Flood Control District, Arizona has been operating this ALERT station at the Portal, Arizona Volunteer Fire Station Since 2000. Realtime data generated by this system may be viewed at <https://Cochise.jefulleralert.com/>

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>