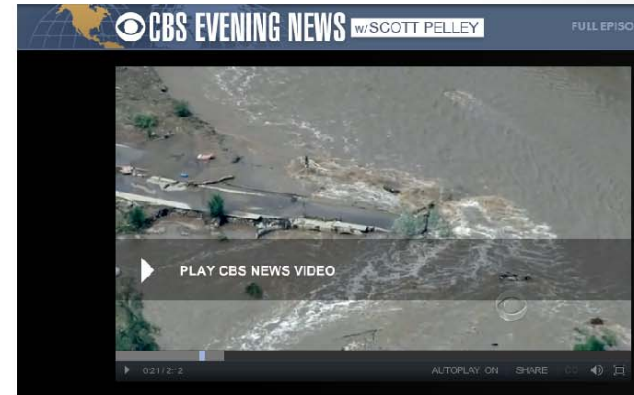




By ANNA WERNER | CBS NEWS | September 20, 2013, 7:55 PM

Flood warning system likely saved hundreds of lives in Colo.

2013 Colorado Flood Recovery

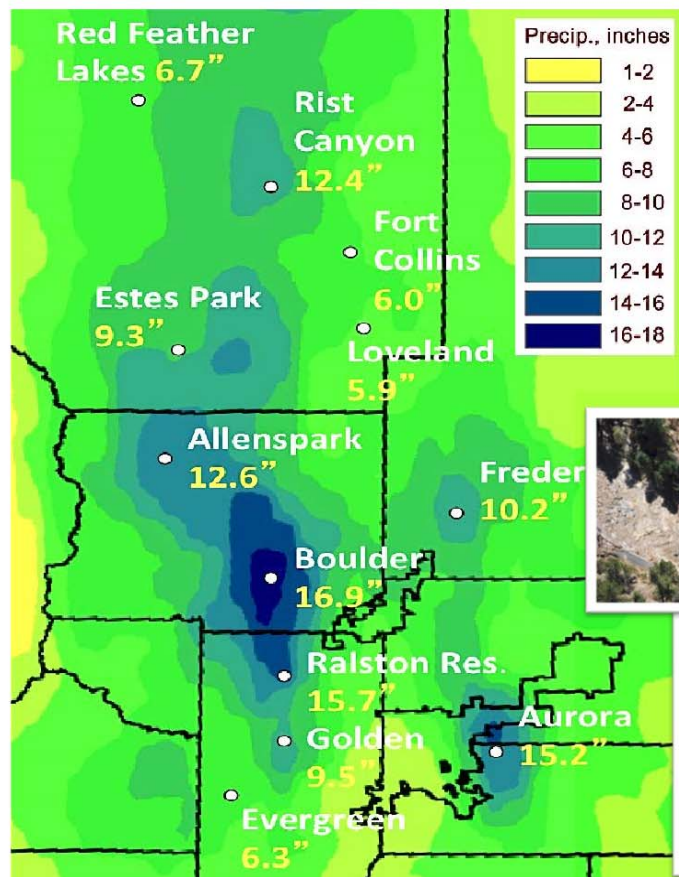
...preparing for the next "Big One" thru enhanced decision support

Kevin Stewart, P.E., Manager
Information Services & Flood Warning Program
Urban Drainage and Flood Control District, Denver, Colorado

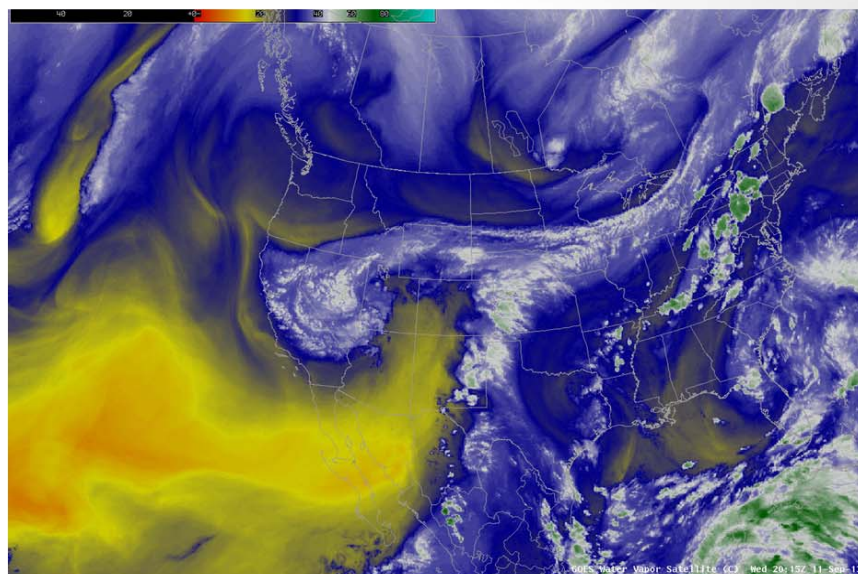


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The Big Event



**7-day totals exceeding
average annual precip**



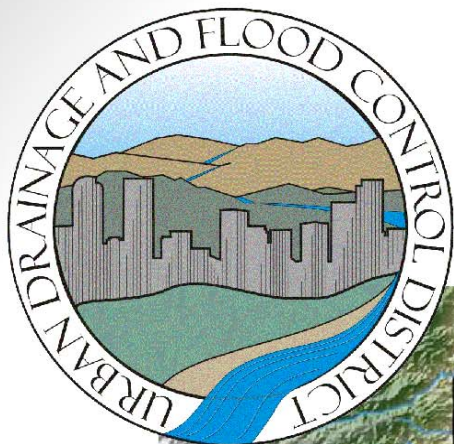
"1,000-year Rainfall"



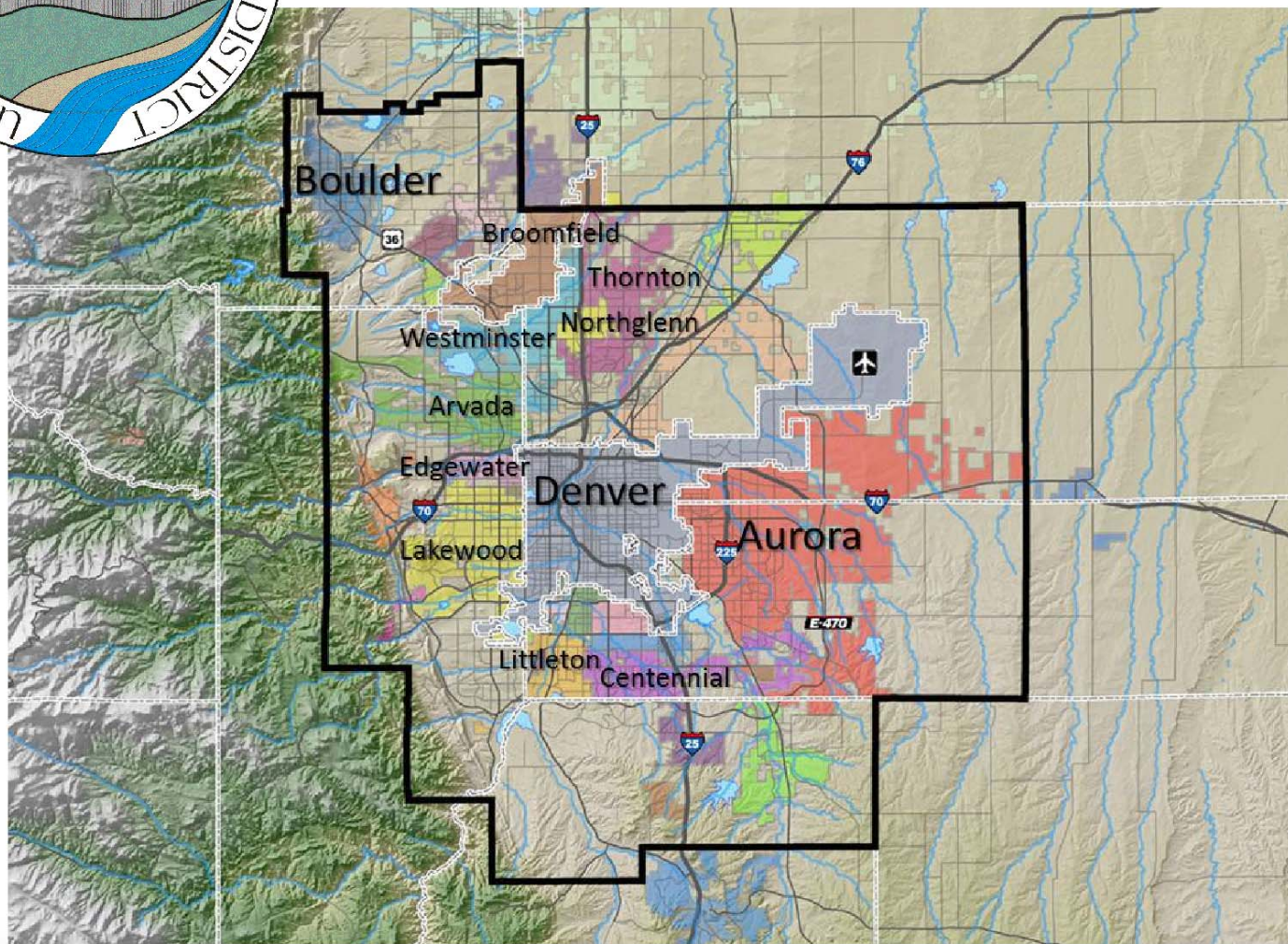
October 28-29, 2015

7th Annual NHC Texas Workshop

1



Urban Drainage and Flood Control District





A Federal/Regional Early Warning Part

Urban Drainage & Flood Flood Warning P



*Serving the greater Denver/Boulder metropolitan area since 1979
in cooperation with NOAA's National Weather Service*



Flood Warning Program Primary Mission



Provide local governments with early notifications of potential and imminent flood threats (*primarily flash flood threats*) in time to take appropriate defensive actions...



protecting lives and property



FWP Components



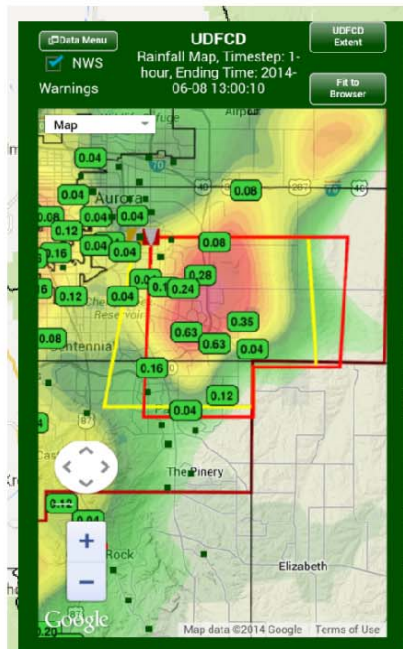
- Prediction & notification services (F2P2)
- The ALERT System
- Radar integrations
- Real-time hydromodels
- E-notifications (Text-Email-Twitter)



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*Developing and maintaining a reliable and easy to use
source of information...a never ending process*

IMPROVING FLOOD DETECTION



The ALERT System Web Map Services Decision Support



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231 ALERT Stations
198 Rain Gages
109 Stream Gages
25 Weather Stations
10 Repeaters

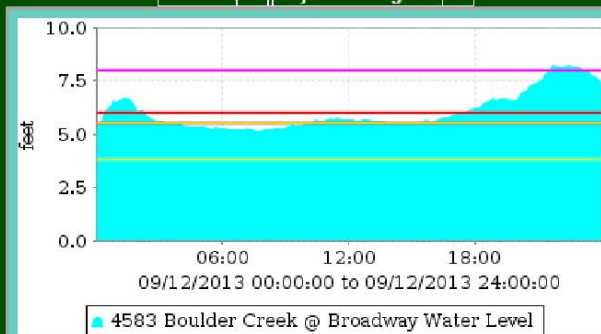
Boulder Creek @ Broadway Water Level

4583 - Boulder Creek @ Broadway Water Level
Last Report: 2013-09-12T23:59:40

Current stage: 7.42

Current discharge: 3985

Bankfull:	5.5	Minor Flooding:	5.5
Action:	3.8	Moderate Flooding:	6
		Major Flooding:	8



Last 100 Novastar5 reports

More data sources + improved interpretive point/click features



— 4583 Boulder Creek @ Broadway Water Level



One stop shopping for partners

The ALERT System

UDFCD's Real-Time Flood Detection & Current Conditions

[HOME](#) [DISCLAIMER](#) [MAPS](#) [TABLES](#) [HYDROMODELS](#) [F2P2](#) [SUBSCRIBE](#) [MORE...](#) 

REAL-TIME FLOOD DETECTION & FORECASTS



Welcome to the [Urban Drainage and Flood Control District's](#) new ALERT System website developed to better accommodate handheld devices such as smartphones, Apple iPads and Windows Tablets. Some of the linked webpages from this site require Adobe Flash. Apple and Android users will not be able to view these pages. Other links are designed primarily for desktop and laptop users, but may also work well with smaller devices. In time these applications will become more handheld-friendly.

Smartphone users can begin using this website by touching the menu icon in the upper right corner. We hope you enjoy your browsing experience and can easily find the information you are looking for. We welcome your [comments and suggestions](#).

Most of the features from the previous 'alert5.udfcd.org' website have been migrated to this new page. [Click here](#) if you prefer to use the old alert5 website or use the public [Contrail](#) website.



RECENT POSTS

- New ArcGIS Map
- System Status
- NHWC newsletter
- Blinking Alarms
- Wednesday Webinars

ARCHIVES

- April 2015
- March 2015
- December 2014
- August 2014
- July 2014
- May 2014

CATEGORIES

- FRAUG Emails
- Newsletters
- System Status
- Uncategorized



Public website by OneRain

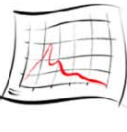


 **Urban Drainage and Flood Control District**

Map Sites Dashboards Bookmarks

Home

Welcome to the Urban Drainage and Flood Control District's real-time data pages. From here you may review rainfall-related and weather activity throughout the region. Use the navigation toolbar above to navigate, find help, and other resources related to weather and storms in the Denver metro area.



[Weather Forecast](#) [Rainfall Forecast](#) [NWS River Forecast](#) [Flood Maps](#) [USGS Gauges](#) [Water Level Summary](#)

Rainfall Map

1 hr 3 hr 6 hr 12 hr 24 hr 48 hr

Water Level Map

[Current Levels](#)

Boulder Creek Cam

Provided by Boulder County



Bear Canyon Creek Cam

Provided by Boulder County



Fourmile Creek At Orodell Cam

Provided by USGS





*Understanding the risks, improving communications,
organizing & integrating resources, having a plan,
knowing what to do & practicing what to do.*

FLOOD RISK MANAGEMENT

Flood Hazard Information Tool



UDFCD FHIT

Structure Query

Login



ADDRESS

CITY

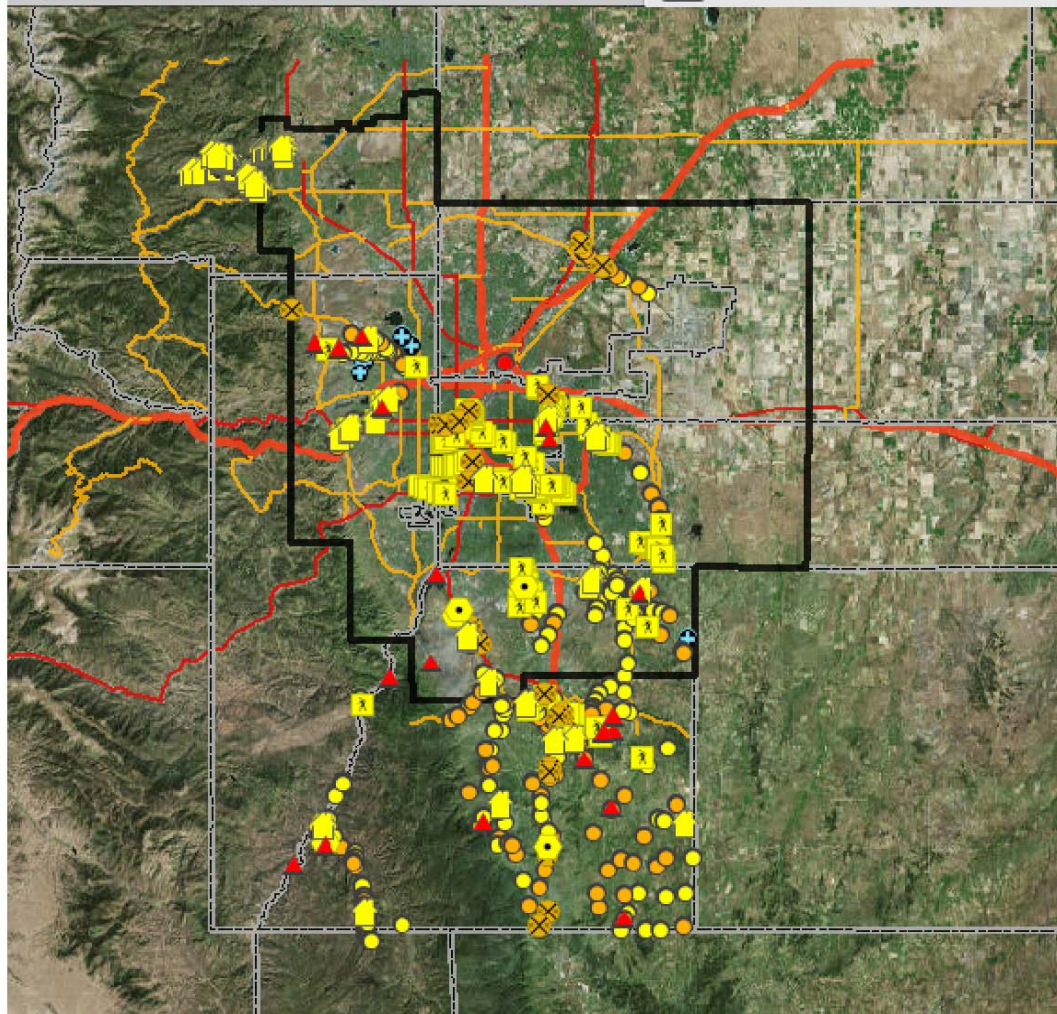


Table of Contents

- ☒ Aquaduct
- ☒ Highway_Crossing
 - Unknown
 - Bridge
 - Culvert
 - Low Water Crossing
- ☒ Pedestrian_Cro...
- ☒ Railroad_Cross...
- ☒ Commercial
- ☒ Residential
- ☒ Reservoir
- ☒ Critical_Facility
- ☒ Problem_Area
- ☐ Flood warning
- ☐ Douglas County
- ☐ Fourmile Creek



Data Mining & Field Recon



STRUCTURE

Type	Highway Crossing/Bridge
Jurisdiction	Arvada
Owner	Arvada
Structure ID	Null
Access Priority	High
Dimensions	Single box (3 ft high x 50 ft)
Number of Lanes	4
Benchmark	Null
Low Chord Elevation	Null

Drainage Area (sq mi)	Null
Capacity (cfs)	750
2-Year Flow (cfs)	Null
10-Year Flow	2028
50-Year Flow	3762
100-Year Flow	4521
500-Year Flow	8125
Closure Criteria (stage ft)	Null
100-Year Velocity (fps)	8.4
Travel Time (minutes)	Null
Travel Time Methodology	Null

COMMENTS

This bridge did not over top during the Sept 2013 flood, but came very close to overtopping.

FLOODING RISK

10 YEAR



Photo Documentation

The screenshot shows a web application interface for photo documentation. The background is an aerial map of a residential area with three yellow location markers. A green dot is visible on the left side of the map. Overlaid on the map is a 'DATA REVIEW TOOL' window. On the left side of this window is a 'STRUCTURE QUERY' panel with dropdown menus for 'BASIN', 'FLOOD RISK', and 'STRUCTURE TYPE', a 'Search' button, and a 'Clear Everything' button. The main part of the 'DATA REVIEW TOOL' window has a 'Structure ID' dropdown set to 'RCR-HC-010', a 'Show' button, and a 'Delete This Structure' button. Below these are tabs for 'Description', 'Photos', 'PDF', 'Flood Response', 'Flood Guidance', and 'Rainfall'. The 'Photos' tab is active, showing a grid of four small photo thumbnails and a larger photo of a flooded street. Below the photos are 'Add', 'Delete', and 'Edit Caption' buttons. A caption box at the bottom right of the large photo contains the text 'Sep 2013 flood peak'.

STRUCTURE QUERY

BASIN

FLOOD RISK

STRUCTURE TYPE

Search

Clear Everything

DATA REVIEW TOOL

Structure ID: RCR-HC-010

Show Delete This Structure

Description Photos PDF Flood Response Flood Guidance Rainfall

Click a thumbnail to enlarge

Add Delete Edit Caption

Sep 2013 flood peak



Focusing on impact prediction



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UDFCD FHIT

STRUCTURE QUERY

BASIN
Ralston Creek

FLOOD RISK
10-Year

STRUCTURE TYPE
Highway Crossing

Search

Clear Everything

Map showing flood risk areas in Arvada, Colorado. The map displays a grid of streets and flood risk zones. A table of contents is visible in the top right corner.

Structure	Flood Risk (Year)
RCR-HC-001	10-Year
RCR-HC-003	10-Year
RCR-HC-004	10-Year
RCR-HC-005	10-Year
RCR-HC-006	10-Year
RCR-HC-007	10-Year
RCR-HC-010	10-Year

FloodingInArvada



Structures designed to fill and spill and not fail, but do on occasions

UNDERSTANDING DAMS



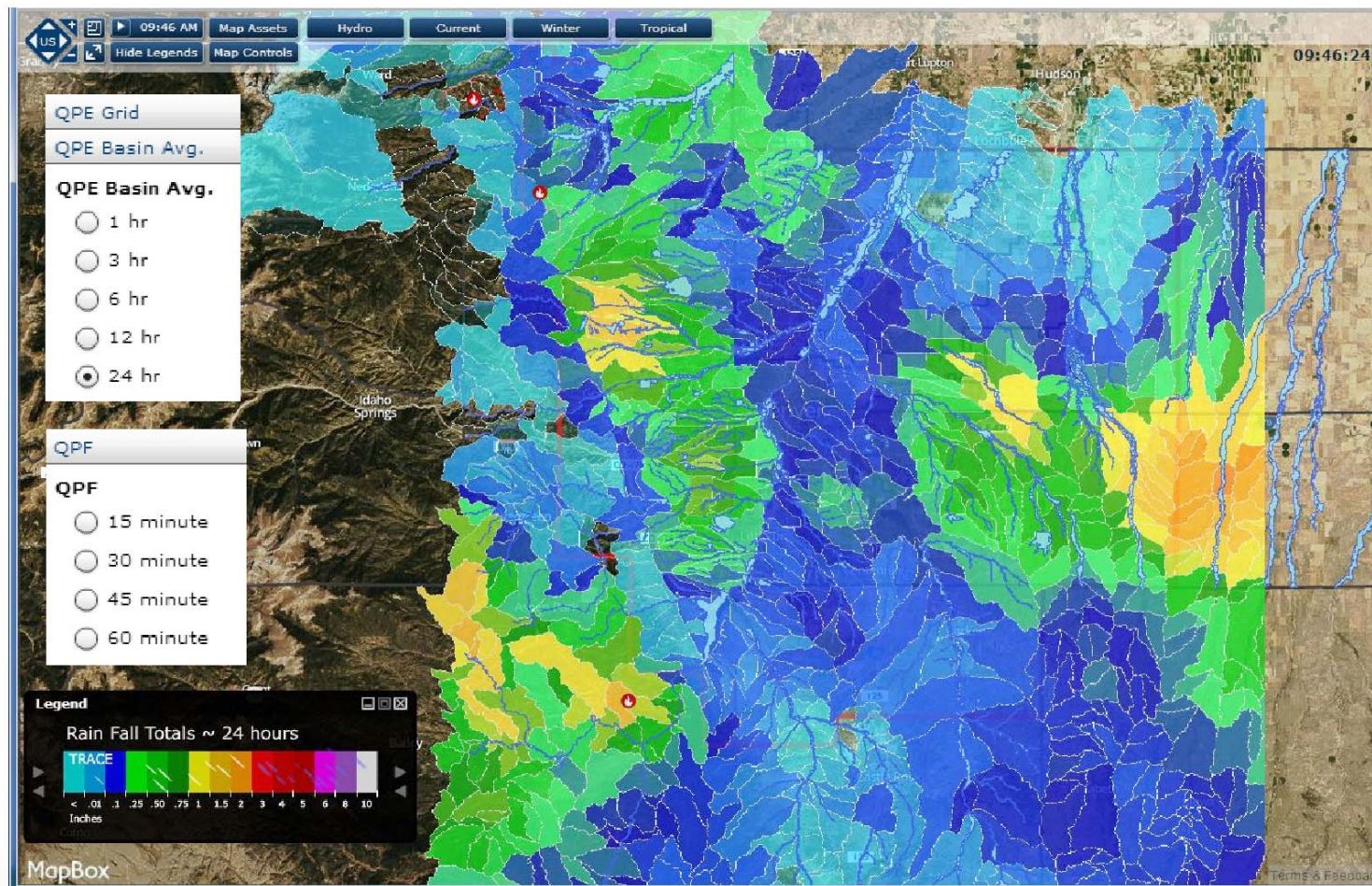
7th Annual NHWC Texas Workshop October 28-29, 2015



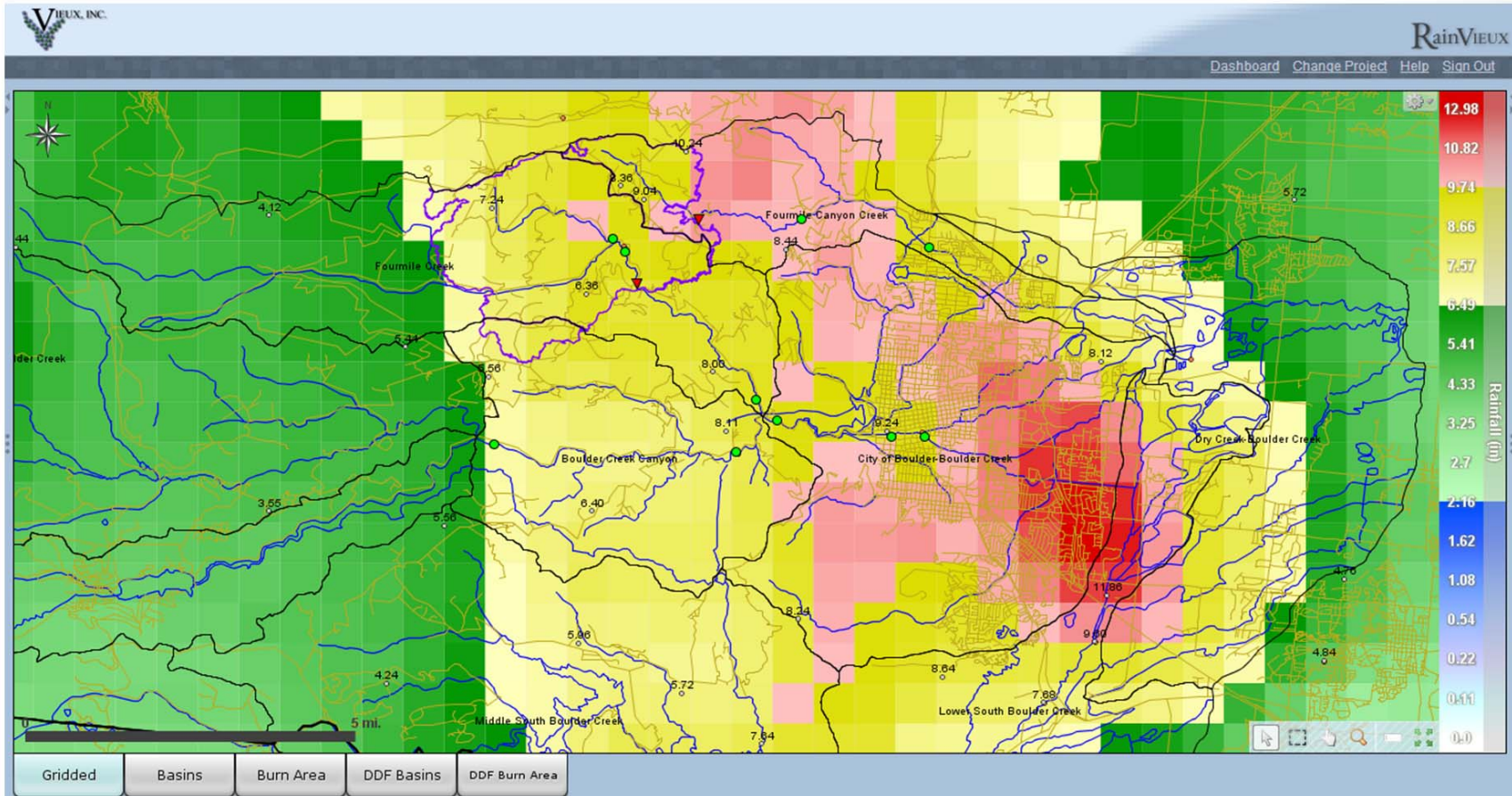
A better picture of heavy rainfall extents & potential impacts?

RADAR-RAINFALL (GARR)

Basin averaging (QPE & QPF)

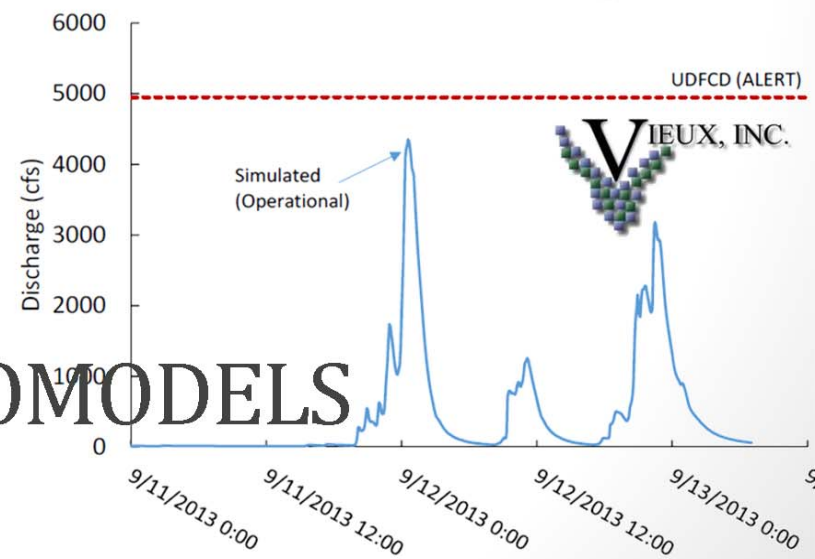
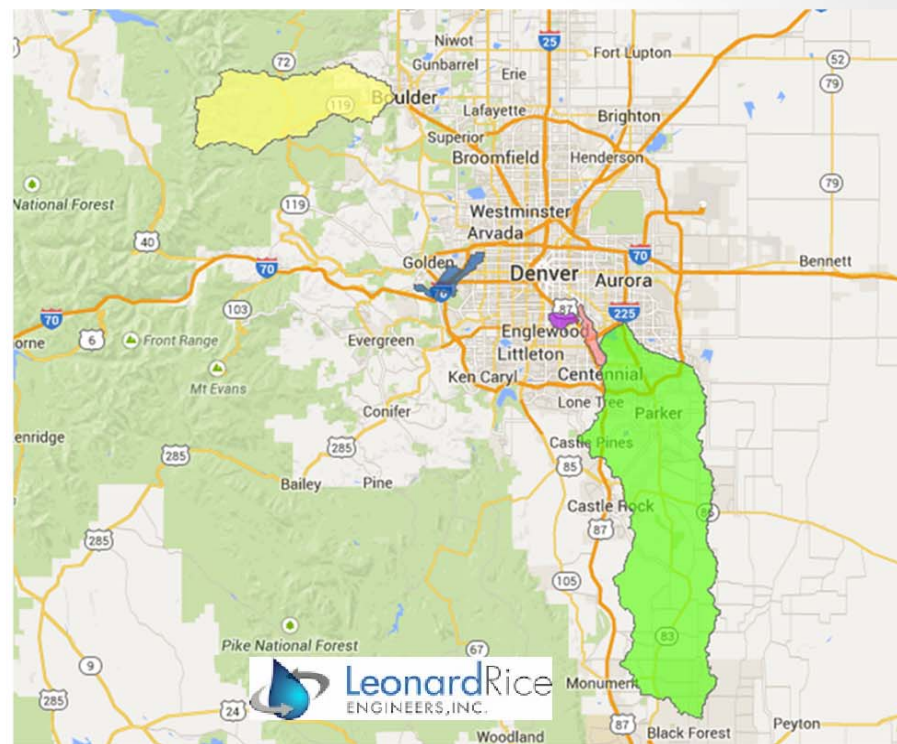
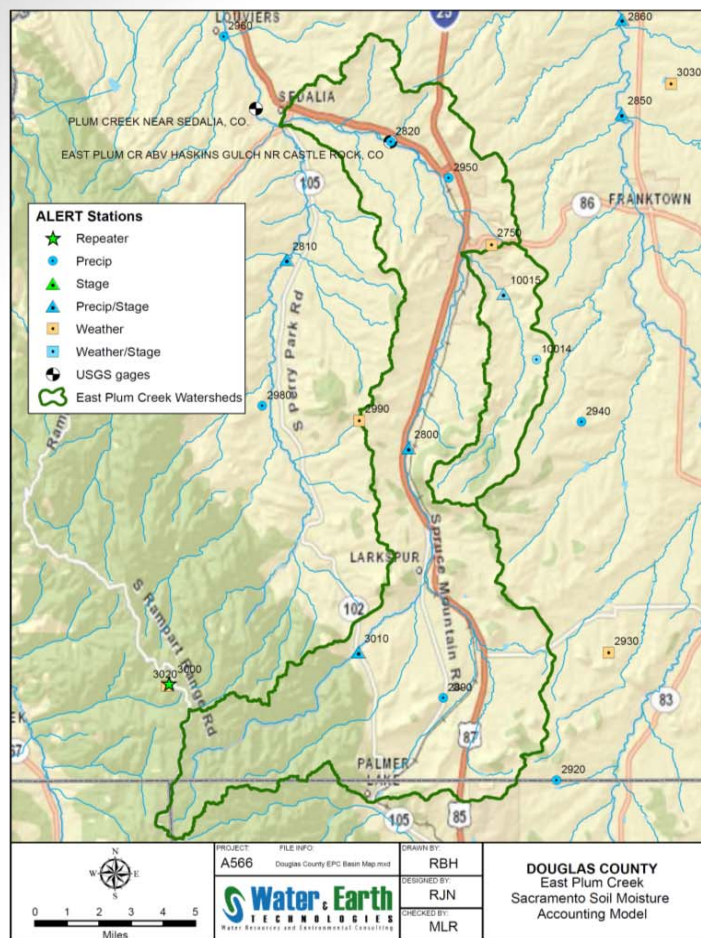


GARR mapped to 1km grids



[Data Disclaimer](#) | [Licenses](#) | Copyright © 2002 - 2014 Vieux & Associates, Inc.





REAL-TIME HYDROMODELS

SSMA, VFLO, CUHP



Pushing Push Notifications

SUBSCRIBE



Join the [Front Range ALERT Users Group](#) (FRAUG) subscription email list to receive information about system updates and new webpage features. Just click on the above link and send your request. After your request is approved you will begin receiving periodic information about the ALERT System. Subscribers may also send emails to the list. Please do not use 'Reply All' unless you intend everyone on the list to read your reply. An archive of the emails are posted to the Blog that is available to all users of this website (*see topics listed under RECENT POSTS*).

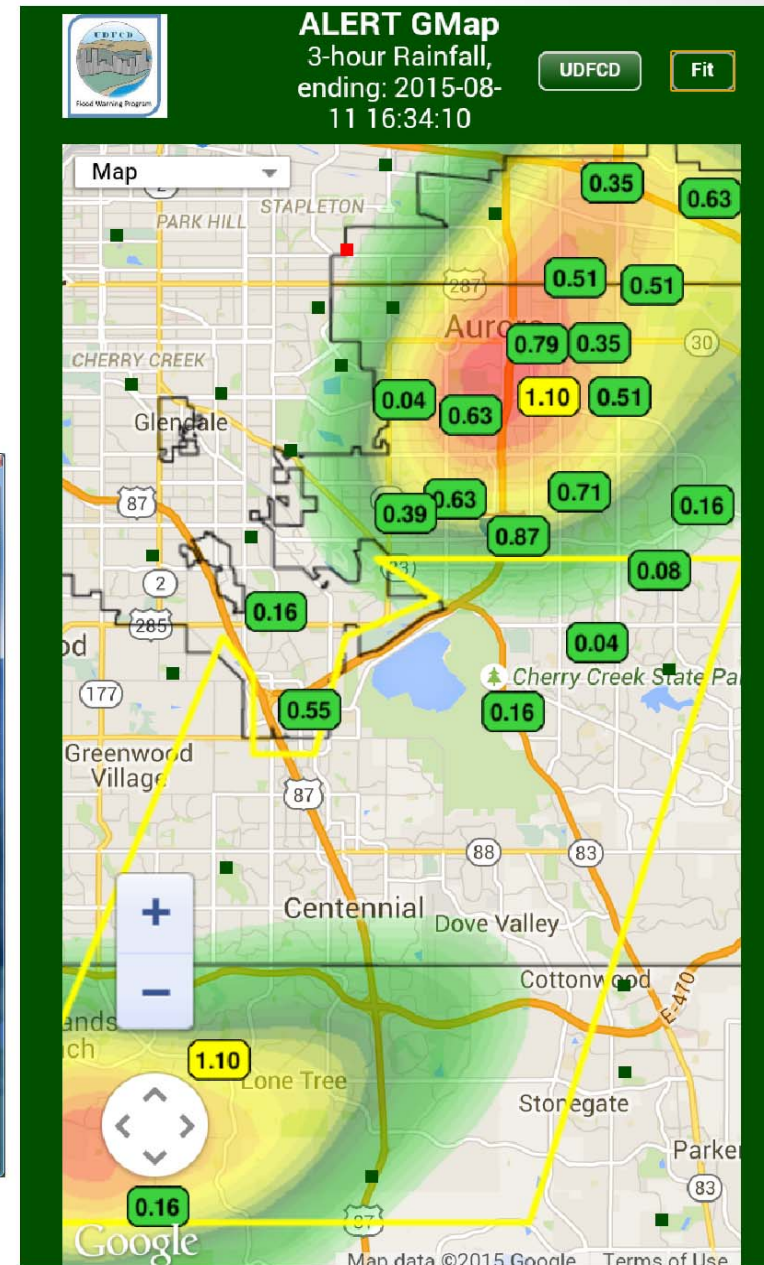
[Notifications](#) ← Click here to sign up for ALERT rainfall and water level alarms; NWS warnings from EMWIN-Denver; and F2P2 flood threat messages and forecast products.

Tweeting in the rain



UDFCD-FWP @UDFCD_FWP · Oct 3

Heavy rain occurring in Jefferson County: goo.gl/2t2t2l #cowx



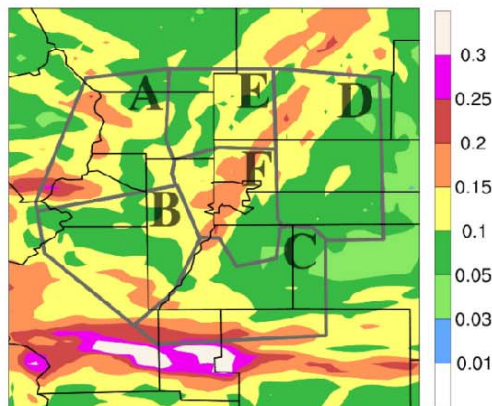
New for 2015

High resolution gridded forecasts



Zone	Threat	Primetime
A	VERY HIGH	13-6Mon
B	VERY HIGH	14-6Mon
C	VERY HIGH	15-2Mon
D	VERY HIGH	13-6Mon
E	VERY HIGH	14-6Mon
F	VERY HIGH	15-6Mon

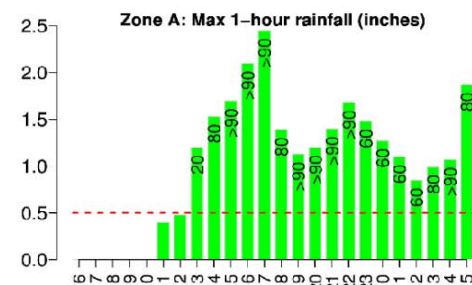
Maximum 1-hour rainfall



Zone-specific Forecasts

Zone A: Northern Foothills

ZONE A: Overall Threat	VERY HIGH
% exceeding 0.5 in 1hr	>90%
% exceeding 2.5 in 3hr	>90%
% exceeding 5 in 6hr	20%
% exceeding 5 in 24hr	>90%
Primetime	13-6Mon





Rod Stewart, 1971

EVERY PICTURE TELLS A STORY



Streaming videos, 1-minute stills, why not drones?

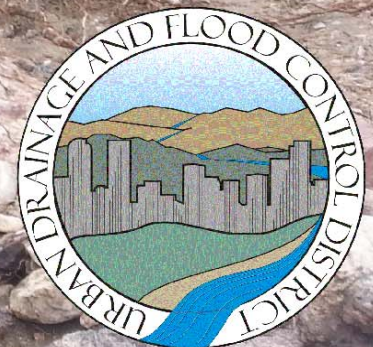
USGS STREAMGAGE WITH LIVE VIDEO WEBCAM—SEPT. 12, 2013



SOME OTHER LESSONS

- ✓ Bad floods happen when we least expect at inconvenient times.
- ✓ Rainfall frequency never equals flood frequency.
- ✓ People ask difficult questions. Be ready with a good, short, simple answer.
- ✓ Do not underestimate the importance of streamgages & their rating tables.
- ✓ Take the time to build relationships now.
- ✓ Be careful where you park your SUV.

“A new normal”





Clip Samples September Storm Colorado, 2013

Vantage Point Media – did not distribute

Questions?



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