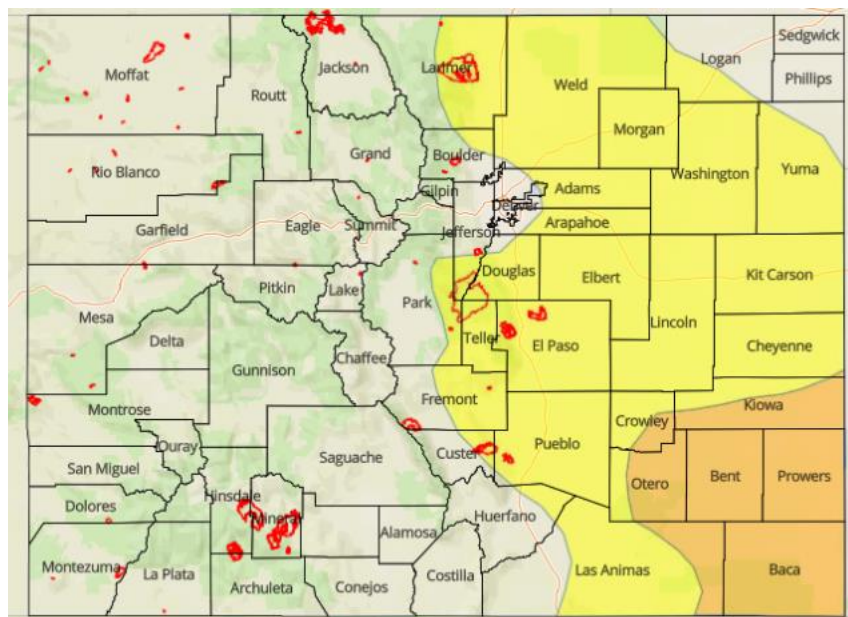
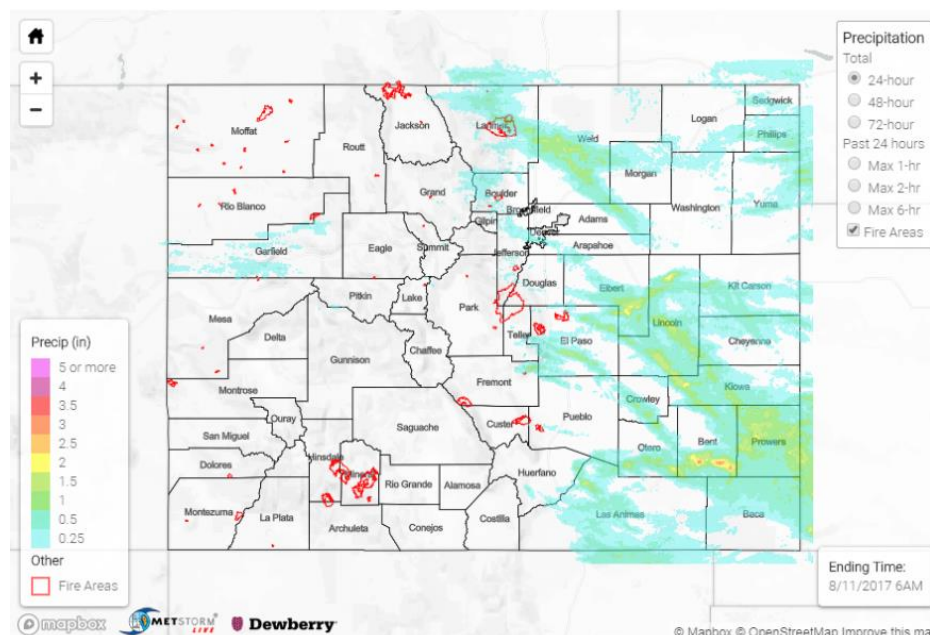


Flood Threat Map – August 10, 2017



State Precipitation Map – August 11, 2017





Colorado Flood Threat Bulletin

Colorado Water Conservation Board

Forecasts Provided by  **Dewberry**

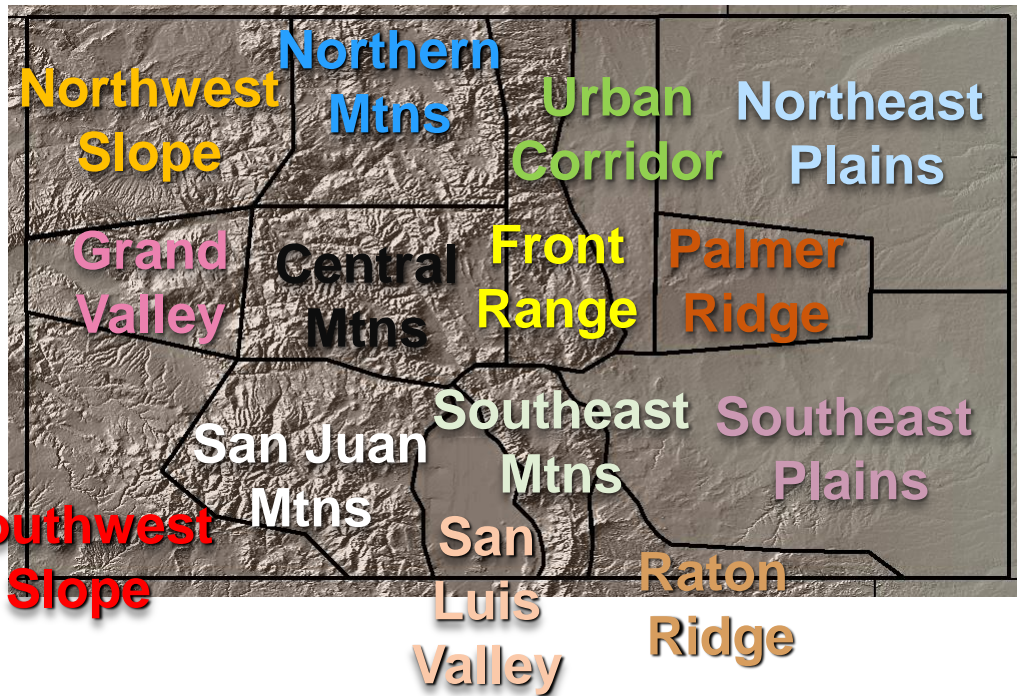
Lead Forecasters: Dana McGlone and Brad Workman

Colorado Flood Threat Bulletin

<http://www.coloradofloodthreat.com>

- Objective: Increase lead time for anticipating heavy rainfall over Colorado during the warm season

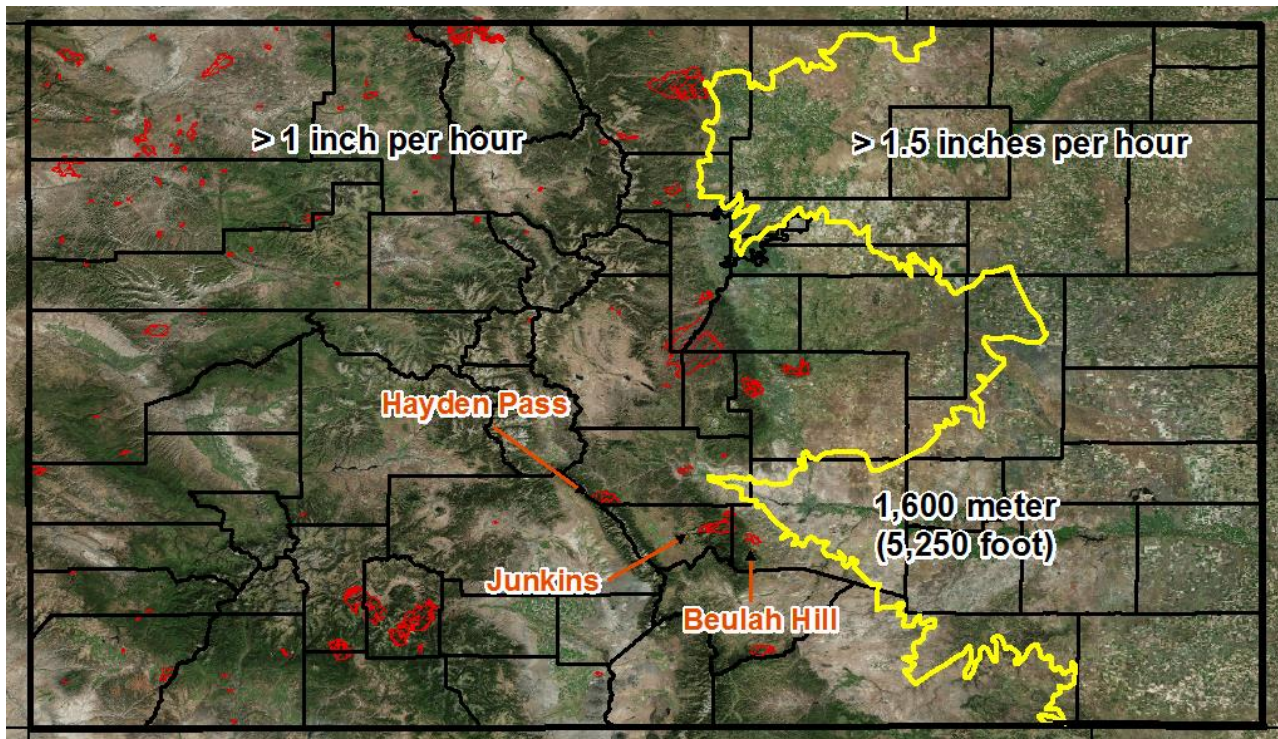
Colorado



- 14 Forecast Zones with a large range in topography
- Product informs users on heavy rainfall:
 - timing
 - location
 - intensity
 - confidence
 - nature of the threat

Motivation

- Many heavy rainfall events occur with little to no lead time
- Can we estimate a daily “realistic” worst-case scenario?
- Can we develop a system that is reliable *and* discriminates between higher and lower threat days?



Products

❖ Flood Threat Bulletin (FTB)

- Issued by 11am daily
- Identifies areas of flood risk for a 24-hr period
- Possible PM updates

❖ State Precipitation Map (SPM)

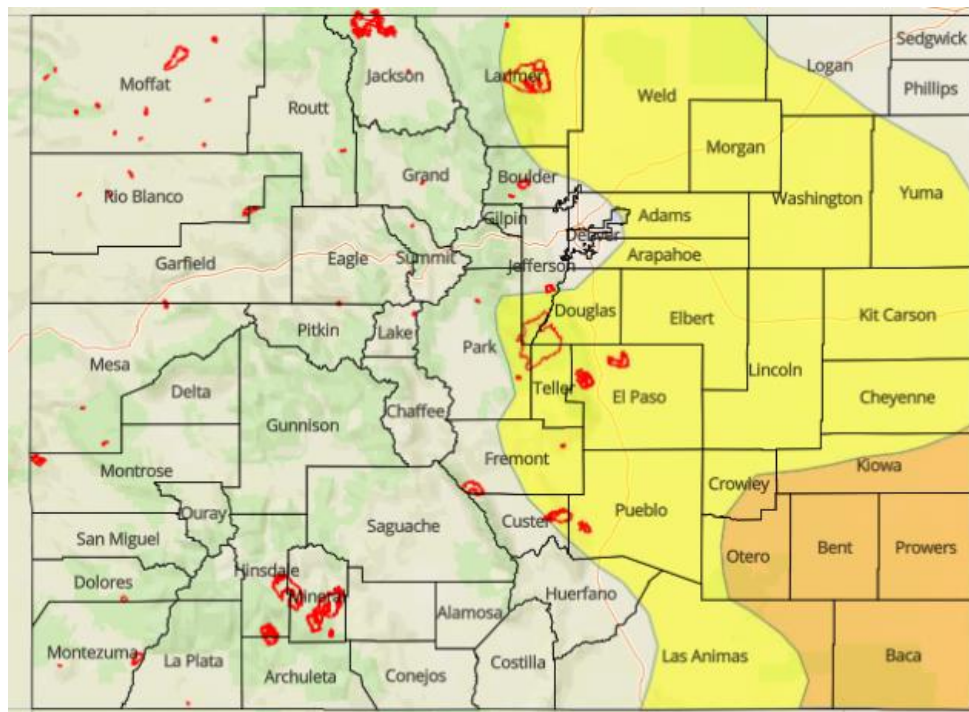
- Issued by 11am daily
- Recaps the past 72-hours of hydrometeorological conditions
- Rainfall totals, flooding, antecedent soil conditions

❖ Flood Threat Outlook (FTO)

- Issued Monday and Thursday by 3PM
- Outlook of threat and precipitation totals over the next 15 days
- Rapid snowmelt, local heavy rainfall, drought development

Flood Threat Bulletin (FTB)

THREAT	DESCRIPTION
NONE	No flood threat is expected.
LOW	Low probability (<50%) that isolated/widely scattered flooding will occur. If flooding occurs, low impact/severity flooding is anticipated.
MODERATE	Moderate probability (50-80%) of flooding occurring.
HIGH	High probability (>80%) of flooding occurring.
HIGH IMPACT	High probability (>80%) of <i>high-impact</i> flooding due to a combination of factors including, but not limited to: high population density, antecedent rainfall and/or long-term duration.



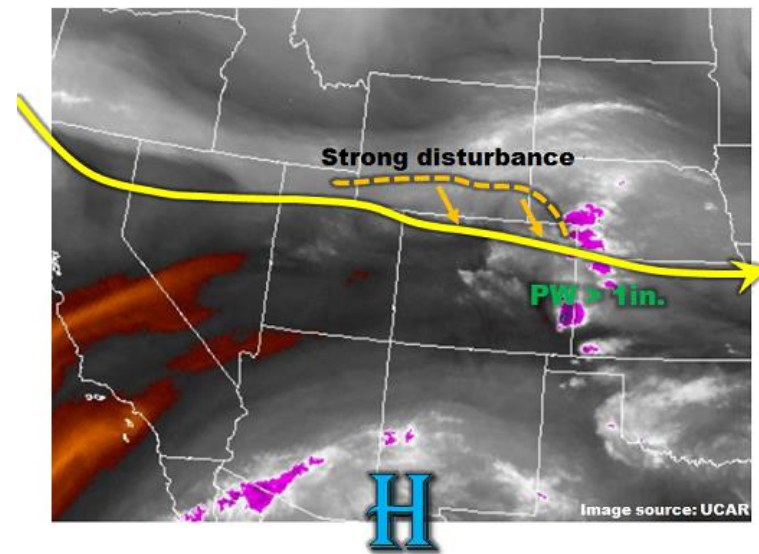
Flood Threat Level



Flood Threat Map
August 10, 2017

Flood Threat Bulletin (FTB)

Discussion (not shown)
with an image:



Zone-Specific Forecasts:

Front Range, Urban Corridor, Palmer Ridge, Northeast Plains, Southeast Mountains, Raton Ridge, Southeast Plains:

Scattered showers and thunderstorms developing by early afternoon. Highest coverage will be over the higher terrain as well as farther east across the Plains. Max 1-hour rainfall up to 2.4 inches (east) and 1.9 inches (west). Max 3-hour rainfall up to 3.8 inches across eastern areas. A Low flood threat has been posted for isolated flash flooding, small stream flooding, mud flows and debris slides (for higher elevations). A Moderate flood threat is in place for far southeast areas, where impacts will also include potential riverine flooding due to the elevated stream over the Arkansas River and its tributaries. Most activity will subside shortly after sunset, but isolated to scattered storms will continue, especially across eastern areas, well into the overnight hours.

Primetime: 12PM to 4AM

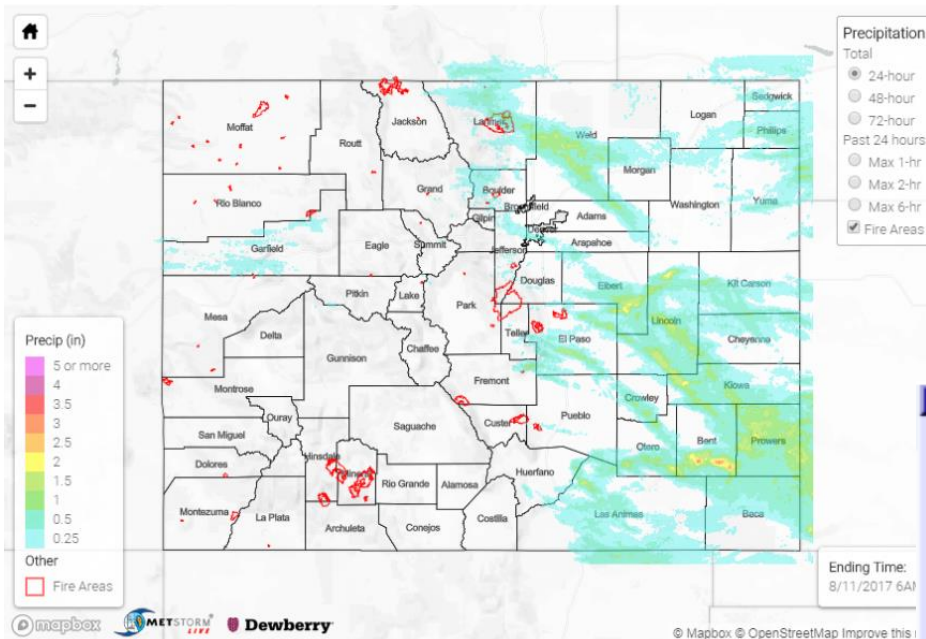
Northwest Slope, Grand Valley, Southwest Slope, Northern Mountains, Central Mountains, San Juan Mountains, San Luis Valley:

Partly cloudy early with isolated to scattered showers and thunderstorms developing by afternoon. Highest coverage will be over northwest areas (especially north of I-70). Max 1-hour rainfall up to 0.7 inches is possible. Gusty winds up to 50 mph and small hail could accompany the strongest cells. Activity will quickly subside after sunset.

Primetime: 12PM to 9PM

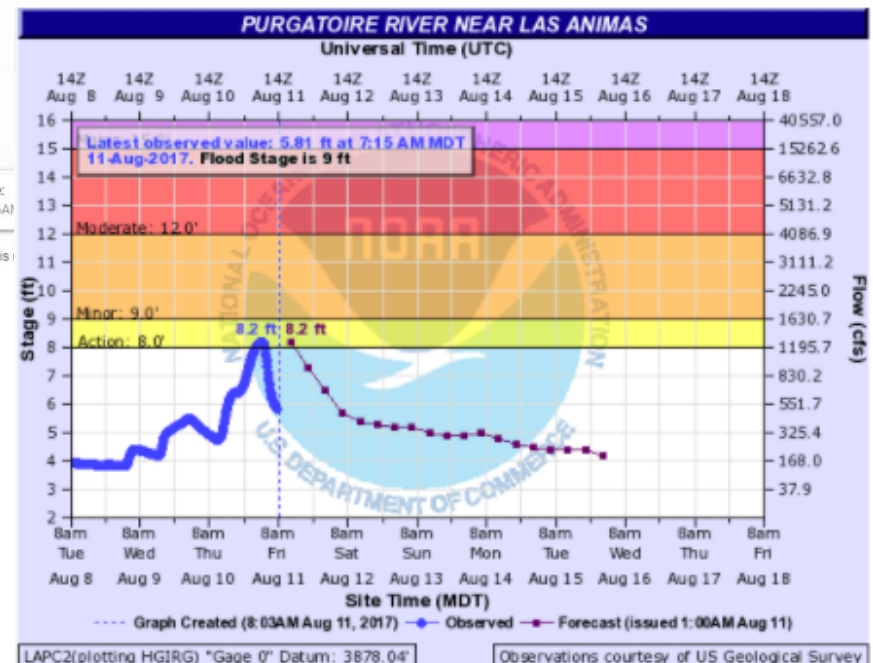
State Precipitation Map (SPM)

SPM – August 11, 2017



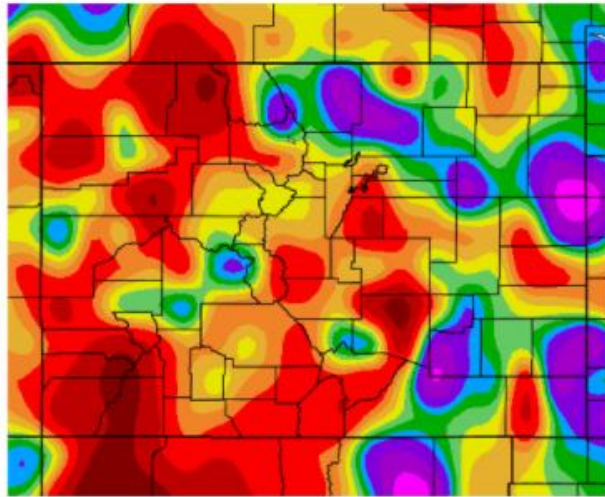
Discussion (not shown)
with relevant image:

Prowers and Bent County
reported 2.75 inch diameter hail
(baseball size)! 2.38 inches of rain
was reported in 45 min over
Greeley.



State Precipitation Map (SPM)

Percent of Normal Precipitation (%)
8/1/2017 – 8/31/2017



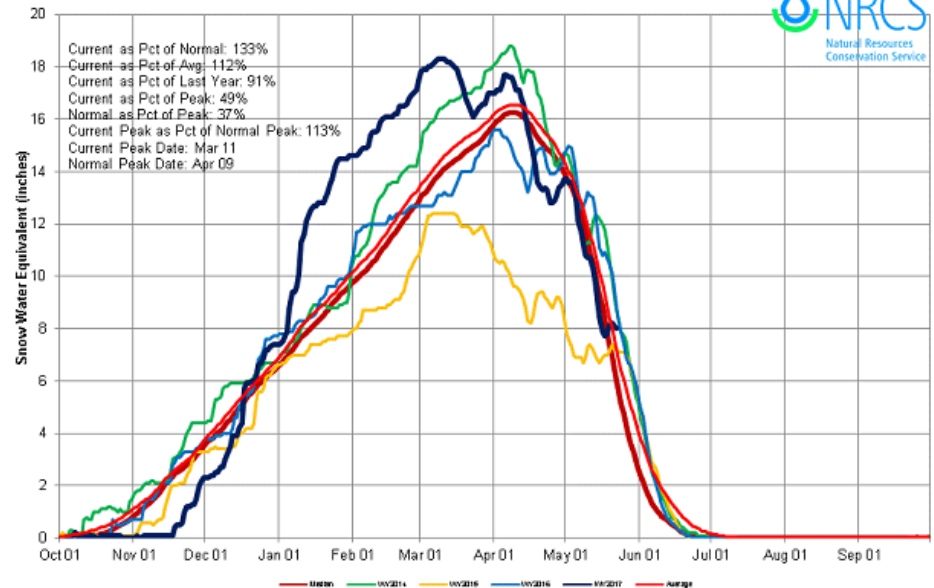
Generated 9/5/2017 at HPRCC using provisional data.

NOAA Regional Climate Centers

Sep 1, 2017: Eastern Colorado
Aug rainfall was well above
normal, while Western
Colorado (with the exception
of the Elks) was below average.

May 24, 2017: Statewide
snowpack shows conditions
almost exactly in sync with
long-term climatology.

Colorado Statewide Time Series Snowpack Summary
Based on Provisional SNOTEL data as of May 22, 2017



Flood Threat Outlook (FTO)

Issue Date: Monday, July 17, 2017

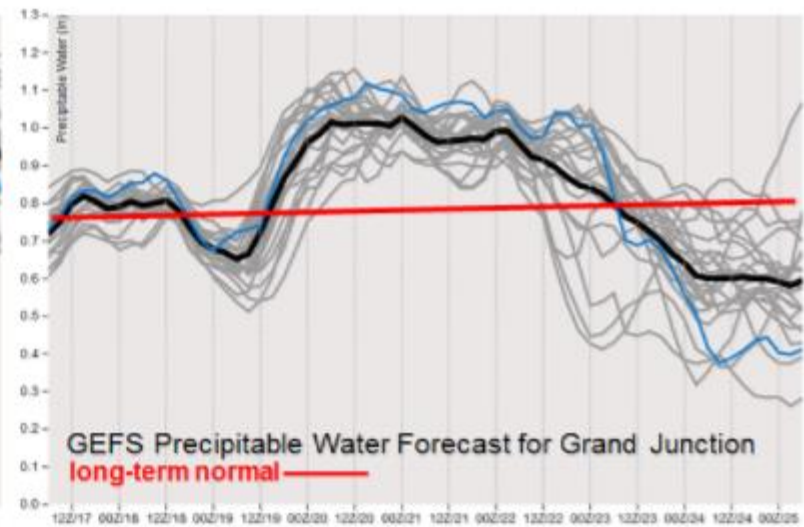
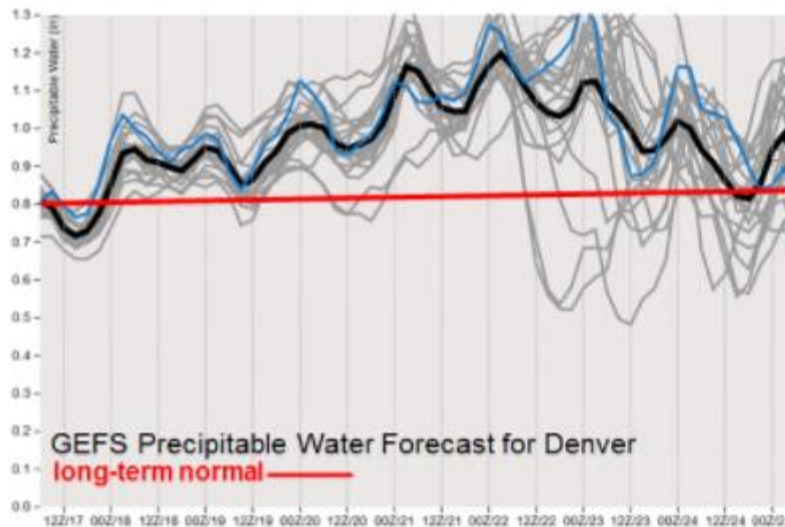
Issue Time: 2:10PM MDT

Valid Dates: 7/18 – 8/1

Next 15 Days	Tue 18-Jul	Wed 19-Jul	Thu 20-Jul	Fri 21-Jul	Sat 22-Jul	Sun 23-Jul	Mon 24-Jul	Tue 25-Jul	Wed 26-Jul	Thu 27-Jul	Fri 28-Jul	Sat 29-Jul	Sun 30-Jul	Mon 31-Jul	Tue 1-Aug
	Event #1			Event #2											

No Apparent Threat Elevated Threat High Threat
FLOOD THREAT LEGEND

Discussion (not shown) with relevant images:

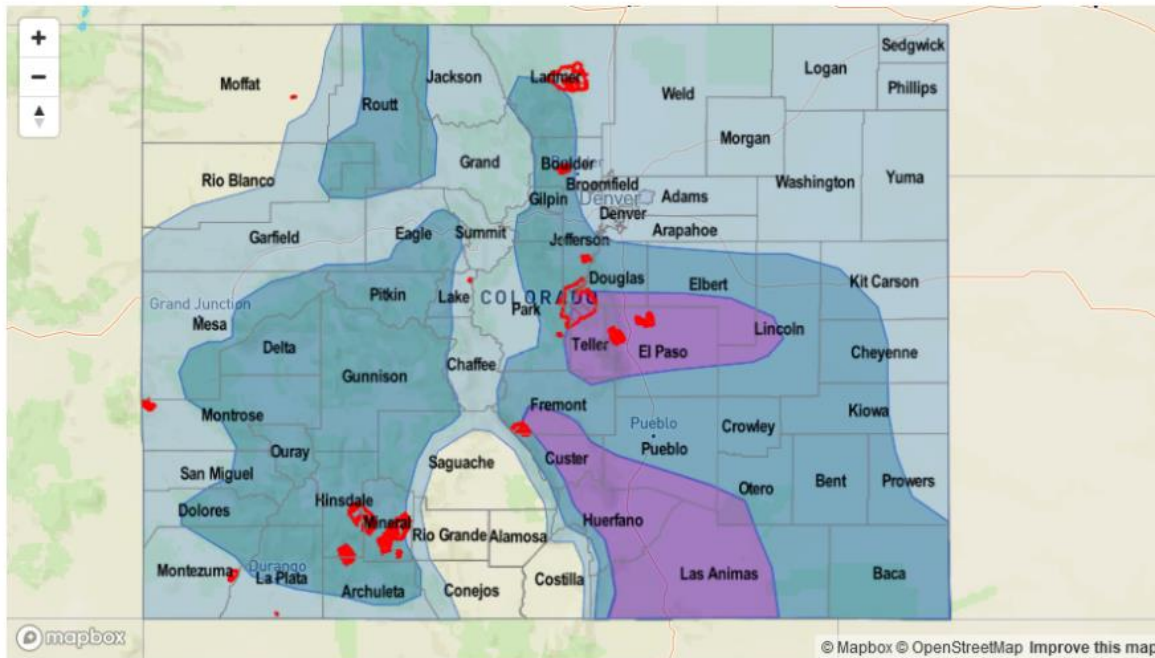


<http://www.emc.ncep.noaa.gov/mmb/cguastini/gefs/EMCGEFSplumes.html>

Flood Threat Outlook (FTO)

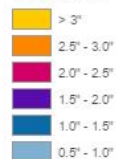
Event #2: Thursday (7/20) through Monday (7/24)

Prolonged **Elevated/High Flood Threat** statewide with monsoon surge (west) and cool front (east) acting as forcing



Discussion (not shown)
with statewide
precipitation forecasts

Precipitation



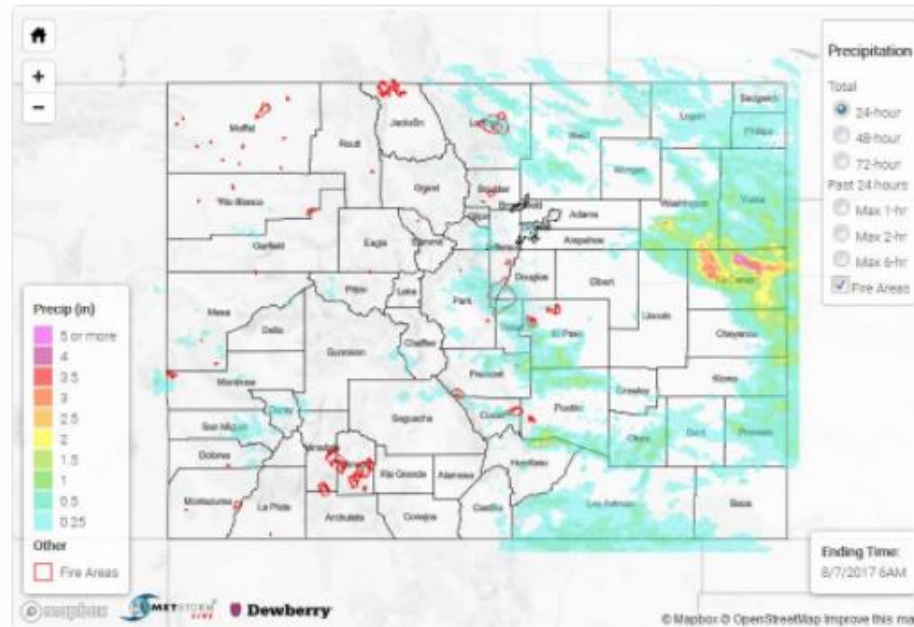
Twitter: @COFloodUpdates



CO Flood Updates @COFloodUpdates · 7 Aug 2017

Replying to @COFloodUpdates

Check out full 24-hour rainfall summary and our new State Precipitation Map here: coloradofloodthreat.com/?cat=4 #cowx #coflood



1 2



CO Flood Updates @COFloodUpdates · 7 Aug 2017

Heavy rain for Eastern CO yesterday. A CoCoRaHS station in Kit Carson County recorded 6.2 inches, which is a 1 in 200-500 year event! #cowx

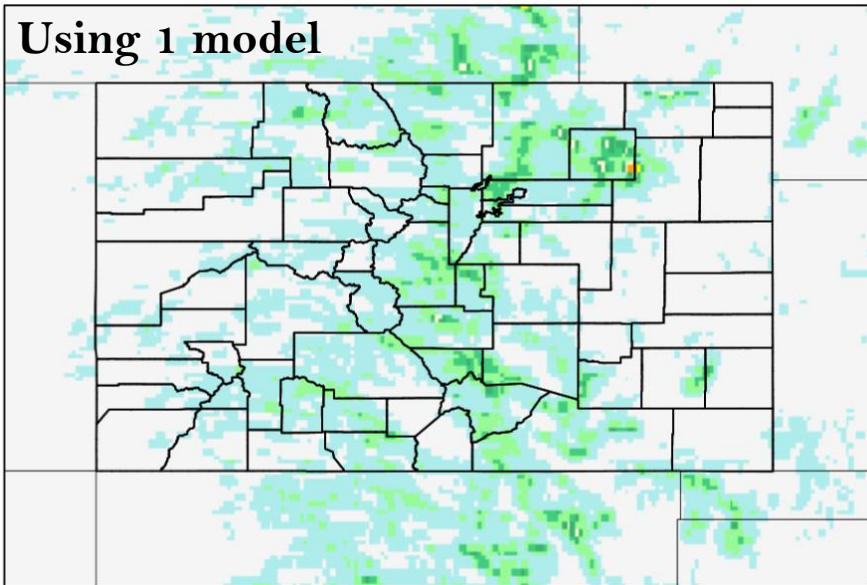
1 1 2

#COFlood
#COwx
#COfire
#SwampCoolerInTrouble
#Monsoon
#Eclipse

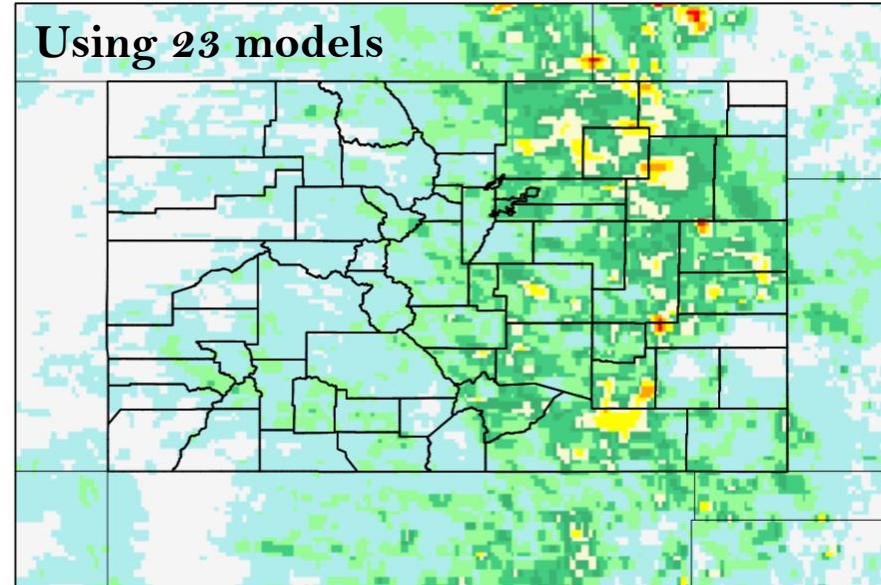
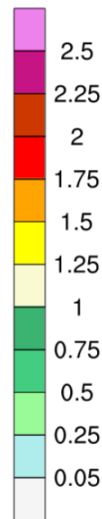
The benefit of an ensemble

Max 1-hour precipitation for 6/7/2017

Using 1 model

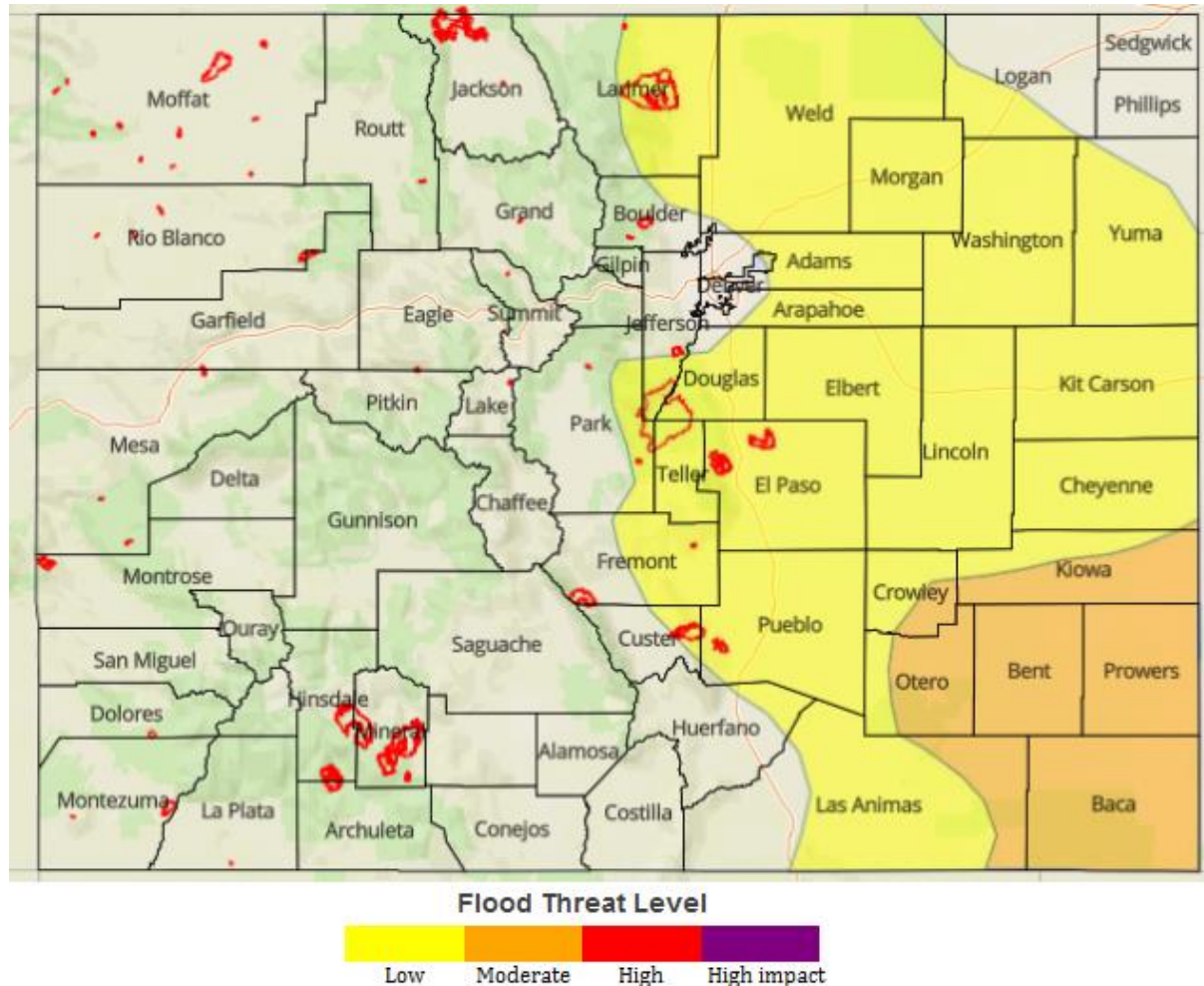


Using 23 models

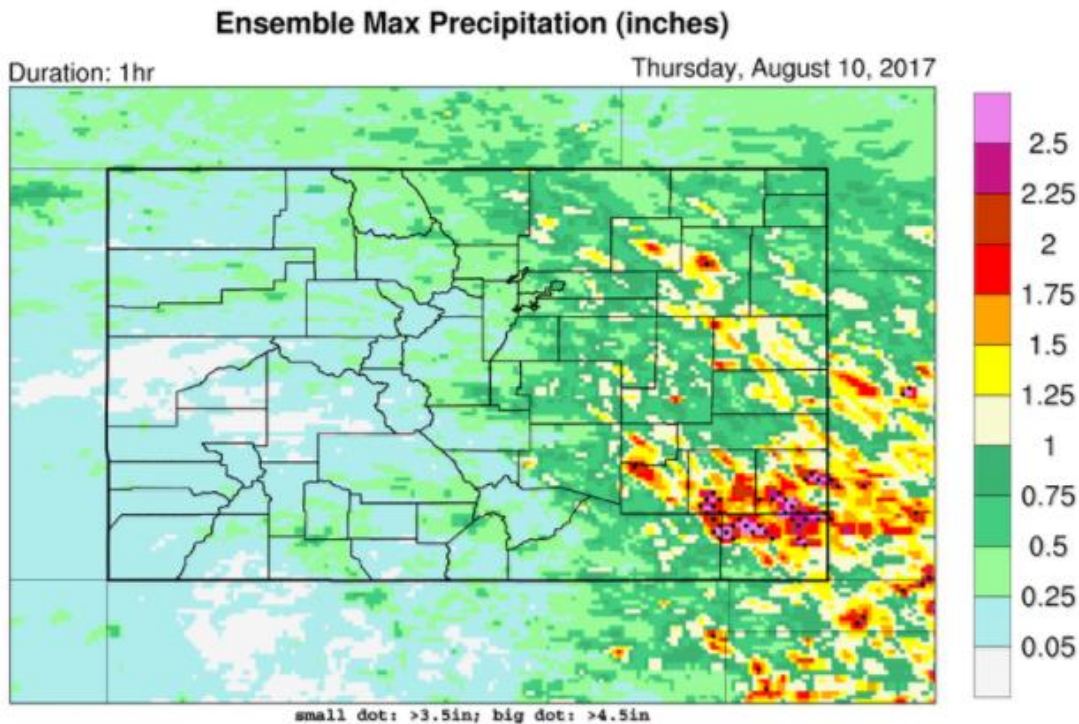
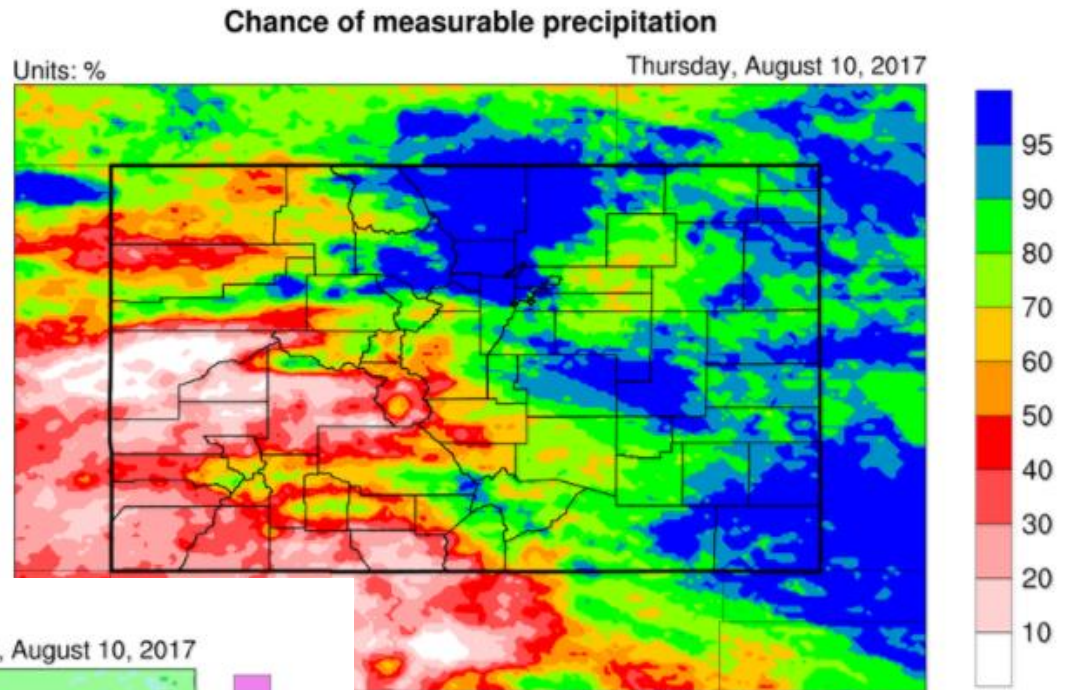


The benefit of an ensemble

August 10, 2017



The benefit of an ensemble



Wrap Up

- ❖ Questions?
- ❖ Products you would like to see?
- ❖ Website: www.coloradofloodthreat.com
- ❖ Twitter: @COFloodUpdates
- ❖ Email: dmcglone@Dewberry.com



Miscellaneous



USGS 07133000 ARKANSAS RIVER AT LAMAR, CO

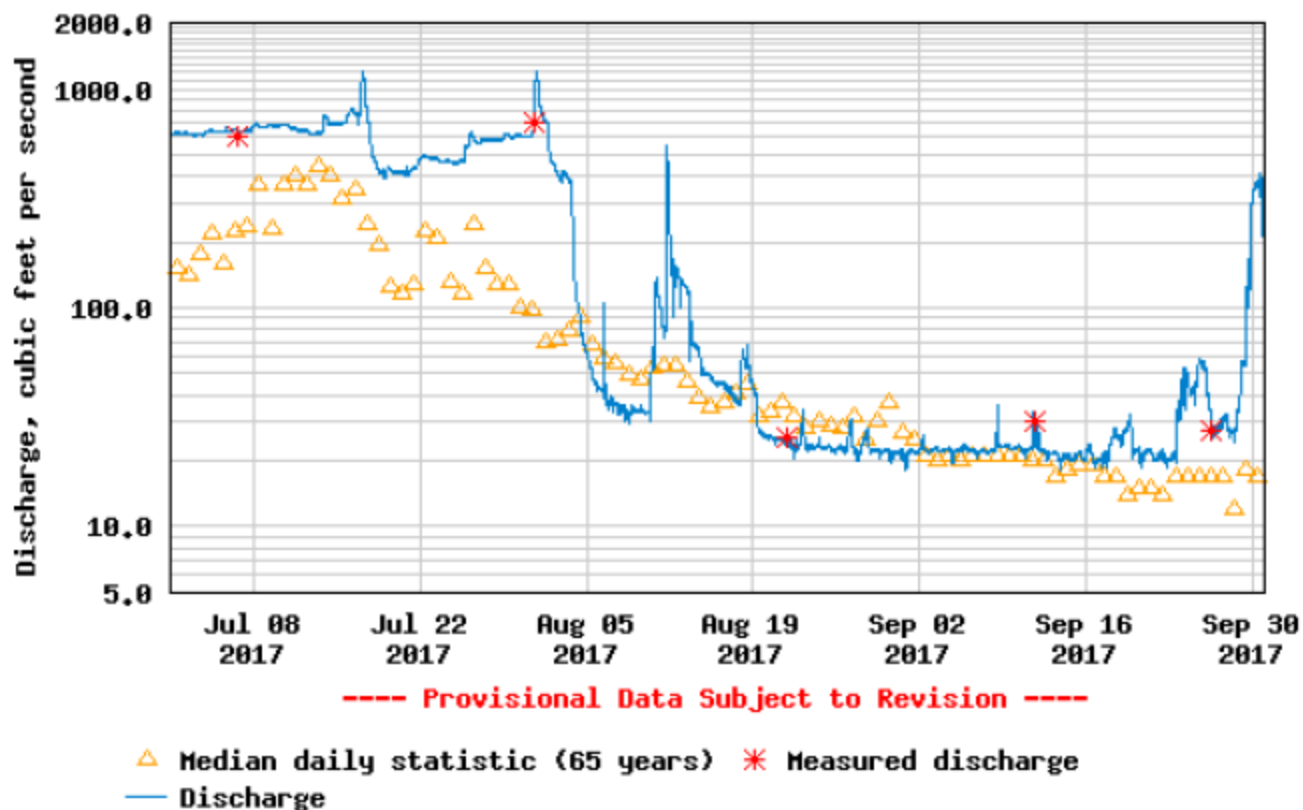
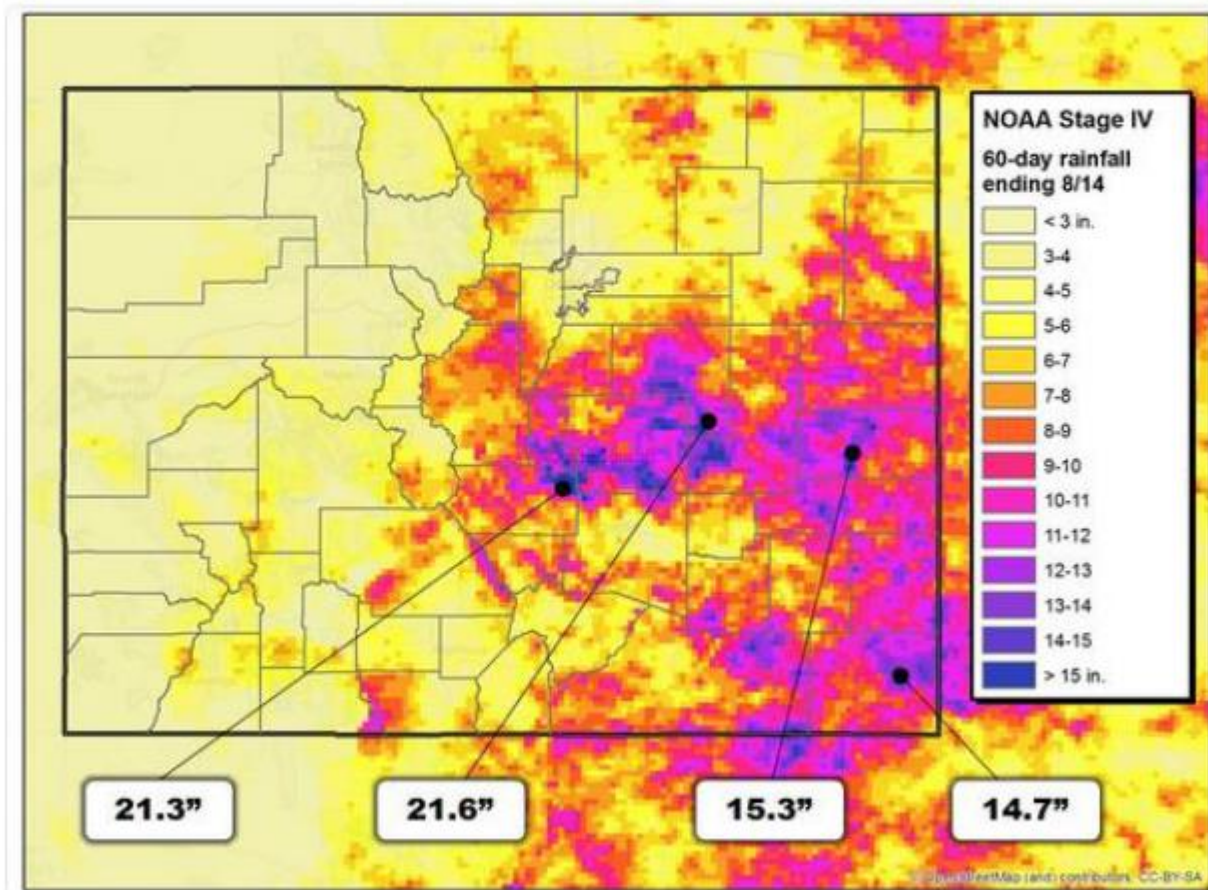


Figure 9: Flow of the Arkansas River at Lamar from July 1 through September 30. Source: USGS.



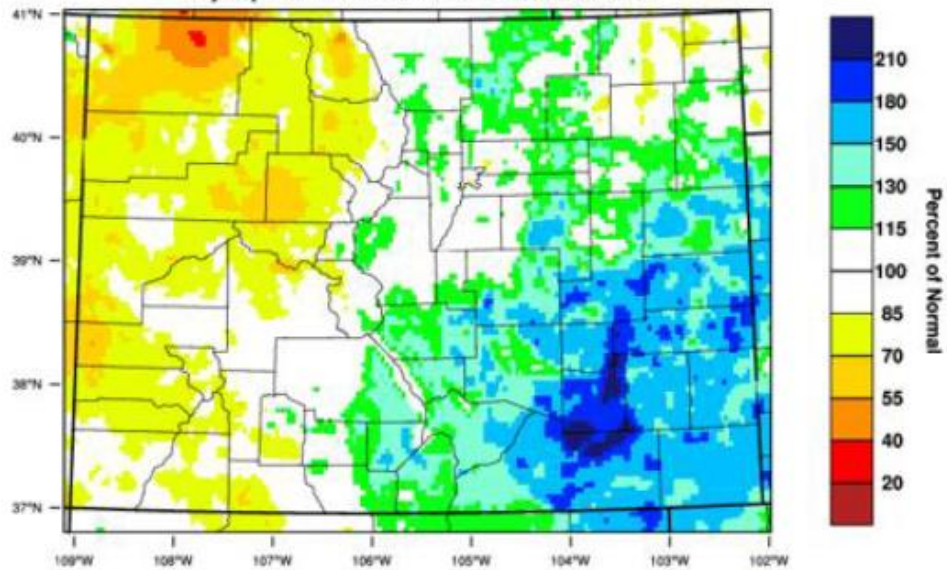
CO Flood Updates @COFloodUpdates · Aug 14

60-day rain has now exceed 20" in parts of eastern CO (at least a 1 in 1000yr event). Luckily major floods have been avoided. #coflood #cowx



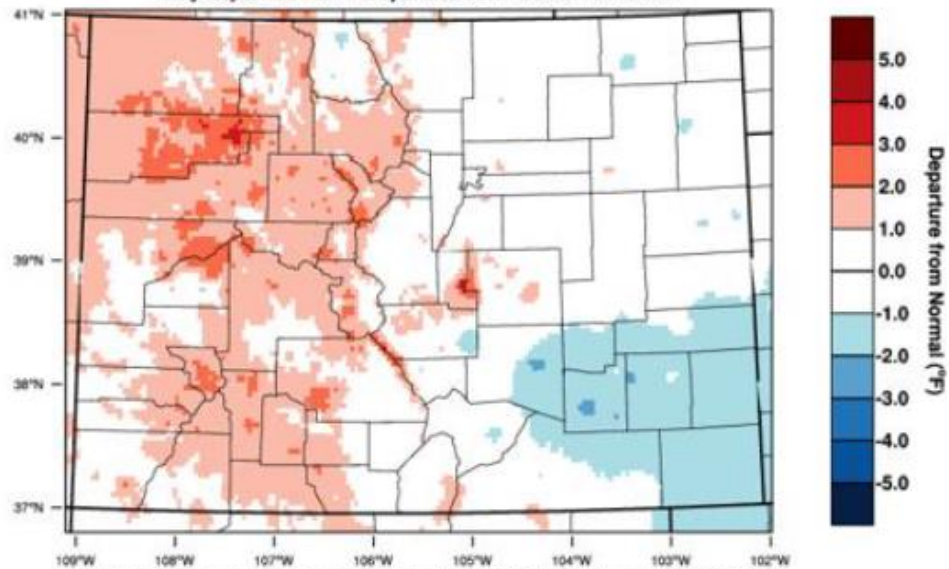
Colorado - Precipitation

May-September 2017 Percent of 1981-2010 Normal



Colorado - Mean Temperature

May-September 2017 Departure from 1981-2010 Normal



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 OCT 2017

Objective versus subjective

PROS

- More easily QC'd
- More flexible



Subjective

- Consistency & reproducibility
- Easier to improve



Objective

- Labor intensive
- May have constraint on skill

- Not always intuitive
- Maintenance

CONS

Operational Process Flow

