

Colorado Water Conservation Board

October 24, 2019

Presentation to
Water Resources Review Committee



COLORADO

Colorado Water
Conservation Board

Department of Natural Resources

Kevin Houck, P.E., CFM
Chief, Watershed and Flood Protection
Colorado Water Conservation Board

A vertical strip on the left side of the slide shows a topographic map of Colorado. The map features contour lines, a grid, and a yellow line indicating a specific path or boundary. The map is partially obscured by the text on the right.

Important Reminder

With all the attention that is traditionally placed on snowpack every spring, it is important to remember that historically, the most damaging floods in Colorado have almost always been from rain-induced events.



Some Key Flood Points to Remember

- Really big floods are not that uncommon (usually at least once per decade). Most would not have been anticipated one week in advance even with today's forecasting skill.

A vertical strip on the left side of the slide shows a topographic map of a river valley. The map features contour lines, a river channel, and a road. The colors range from brown and tan to green and blue, indicating different elevations and water bodies.

Some Key Flood Points to Remember

- Really big floods are not that uncommon (usually at least once per decade). Most would not have been anticipated one week in advance even with today's forecasting skill.
- Colorado snowmelt is usually well behaved.



Some Key Flood Points to Remember

- Really big floods are not that uncommon (usually at least once per decade). Most would not have been anticipated one week in advance even with today's forecasting skill.
- Colorado snowmelt is usually well behaved.
- Snowmelt floods usually require prolonged very warm temperatures and/or widespread late season snowpack including snow on south facing slopes.



Some Key Flood Points to Remember

- Really big floods are not that uncommon (usually at least once per decade). Most would not have been anticipated one week in advance even with today's forecasting skill.
- Colorado snowmelt is usually well behaved.
- Snowmelt floods usually require prolonged very warm temperatures and/or widespread late season snowpack including snow on south facing slopes.
- Most of Colorado's worst floods are rainfall floods.



Some Key Flood Points to Remember

- Really big floods are not that uncommon (usually at least once per decade). Most would not have been anticipated one week in advance even with today's forecasting skill.
- Colorado snowmelt is usually well behaved.
- Snowmelt floods usually require prolonged very warm temperatures and/or widespread late season snowpack including snow on south facing slopes.
- Most of Colorado's worst floods are rainfall floods.
- Significant burn scar flooding is a relatively new problem



Some Key Flood Points to Remember

- Really big floods are not that uncommon (usually at least once per decade). Most would not have been anticipated one week in advance even with today's forecasting skill.
- Colorado snowmelt is usually well behaved.
- Snowmelt floods usually require prolonged very warm temperatures and/or widespread late season snowpack including snow on south facing slopes.
- Most of Colorado's worst floods are rainfall floods.
- Significant burn scar flooding is a relatively new problem
- Floods and drought are not mutually exclusive.

How Did We Avoid Widespread Flooding?

- Most significant statewide snowfall since 1997

Answer: A little luck from Mother Nature and a lot of coordination and preparedness at all levels of government.



A Yo-Yo Season of Transitions

● Denver Statistics:

- 7th coldest May
- 90 Degree Days Before June 26 – none
- 90 Degree Days June 27-Sept 5 – 44 out of 71 days
- 3rd warmest August on record
- 2nd warmest September on record
- Broke the September record by 3 degrees (100)
- 3 out of the first 5 days of September broke the previous monthly record
- 2nd coldest cold snap ever recorded before Oct. 22
- October will likely end up as one of 20 coldest

A vertical strip on the left side of the slide shows a topographic map of a mountain range. The map features contour lines, a network of roads, and a yellow line indicating a specific path or route. The terrain is shaded in various colors to represent elevation.

Why Are Those Statistics Significant?

Without rain-on-snow, snowfields need significant prolonged heat to produce floods.

If the heat had arrived even two weeks earlier,
this summer might have been different.

A vertical strip on the left side of the slide shows a topographic map of a mountainous region. The map features contour lines, a yellow path, and a red dot. The background of the slide is a dark teal color with light teal contour lines.

What Did We Do to Prepare?

- Weekly conference calls with county emergency managers (May and June)



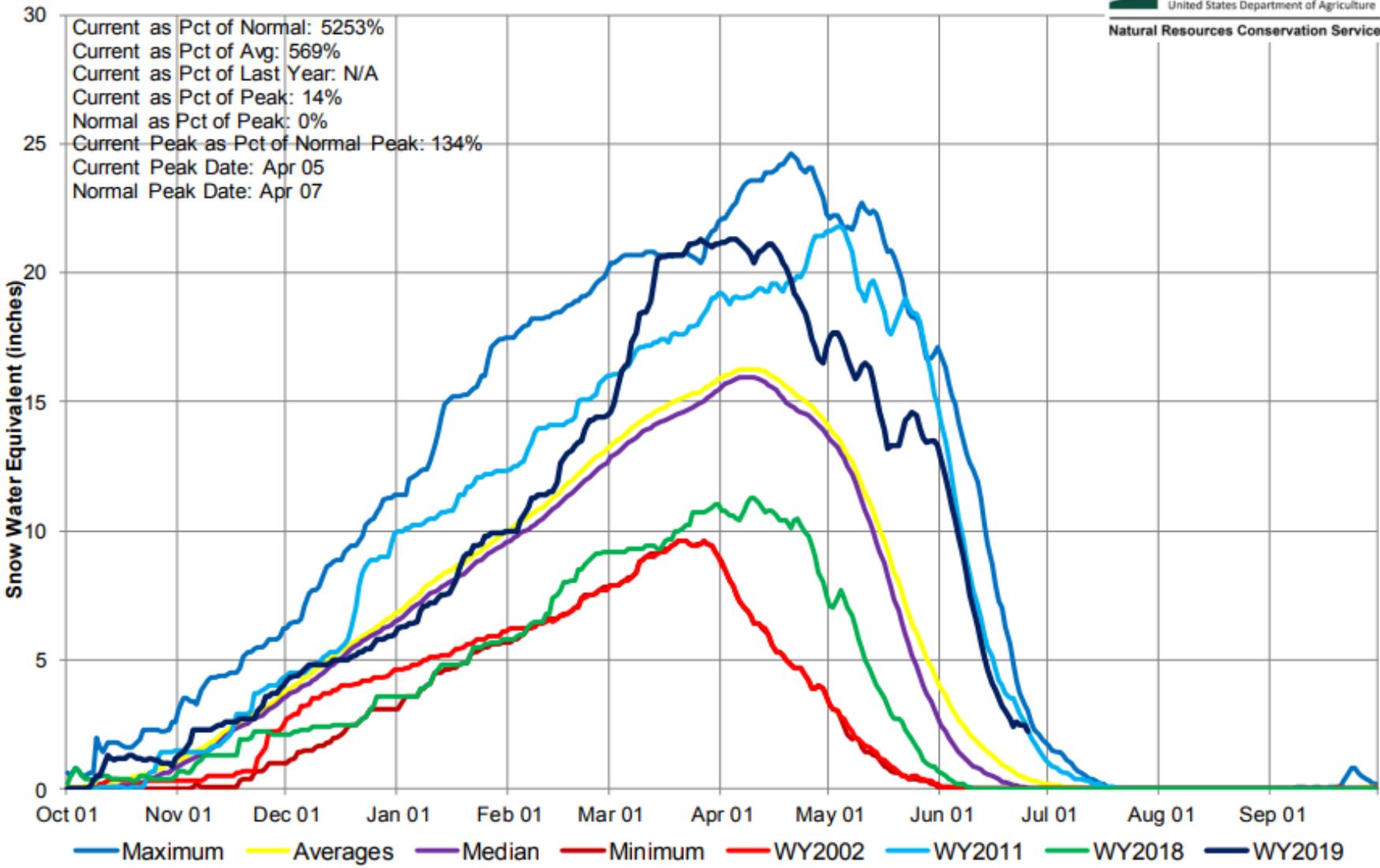
What Did We Do to Prepare?

- Weekly conference calls with county emergency managers (May and June)
- Extensive snowpack monitoring and river forecasting by National Weather Service, Natural Resources Conservation Service, and Colorado Department of Natural Resources

Colorado Statewide High/Low Snowpack Summary

Based on Provisional SNOTEL data as of Jun 25, 2019

USDA
United States Department of Agriculture
Natural Resources Conservation Service



April-Upper Colorado Streamflow Forecasts

Upper Colorado
 April - July
 Streamflow
 Volume
 Forecasts
 as of **May 15,**
2019

(% of 1981-2010 average)
From the CBRFC

Kaf = 1,000 acre feet

% of median

Current Forecast Rank / **Period of Record**

National
 Weather
 Service
 Grand Junction, CO



Flaming Gorge –
 1050 kaf -127%-28/57yrs

Little Snake - Lily
 395 kaf -132%-
 38/98yrs -

Duchesne - Randlett
 530 kaf -166%-
 21/77yrs same - LC

Yampa - Deerlodge
 1360 kaf -116%-
 11/35yrs - down

Gunnison - Grand Jct
 2100 kaf -165%-
 16/102yrs - increase

Colorado - Cameo
 2800 kaf -128%-
 20/86yrs -

Dolores - Mcphee Res -
 down
 395 kaf -158%-9/39yrs

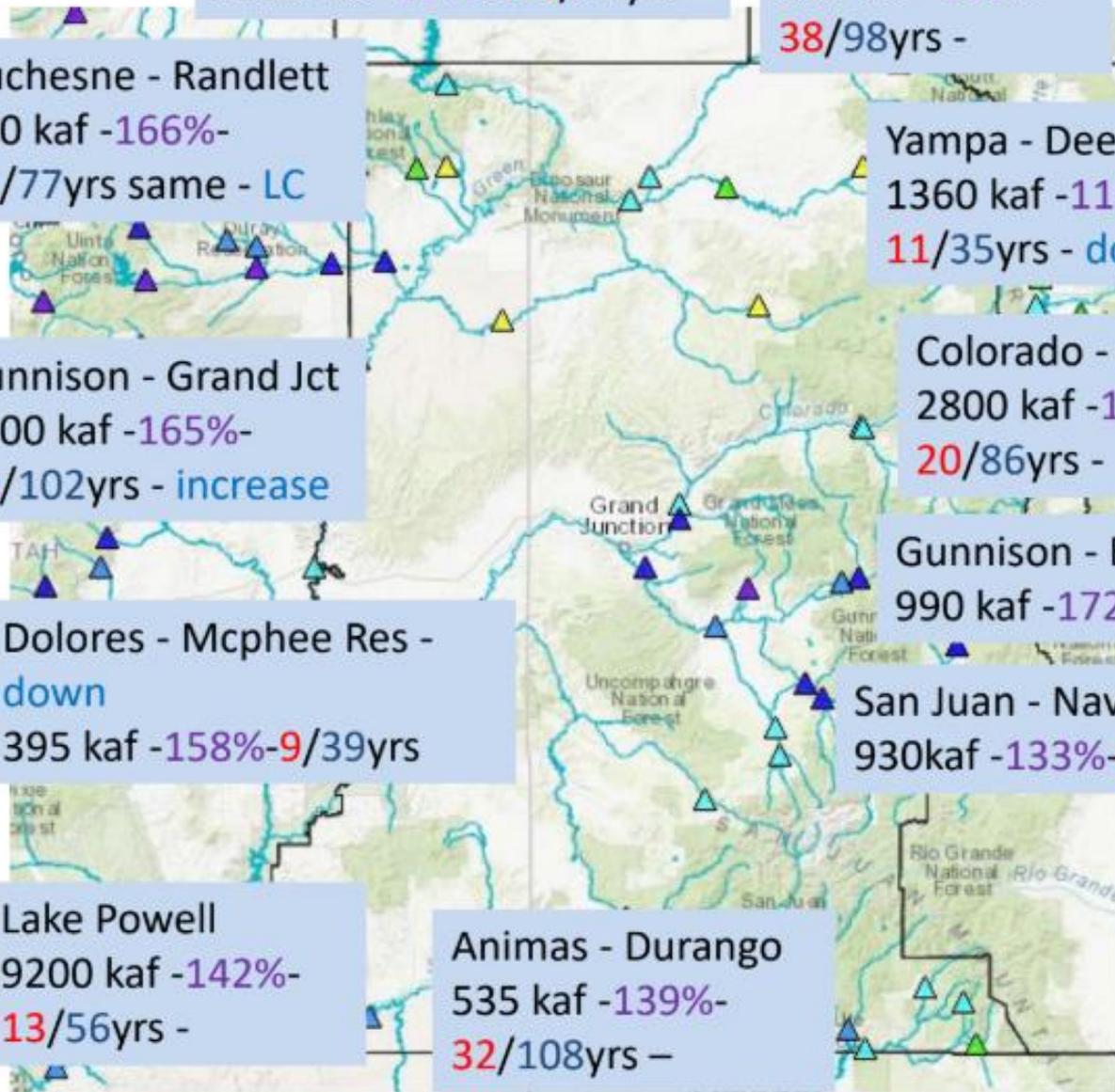
Gunnison - Blue Mesa-
 990 kaf -172%-7/51yrs

Lake Powell
 9200 kaf -142%-
 13/56yrs -

Animas - Durango
 535 kaf -139%-
 32/108yrs -

San Juan - Navajo Res -
 930kaf -133%-13/49yrs

- ▲ < 70%
- ▲ 70-90%
- ▲ 90-110%
- ▲ 110-130%
- ▲ >130%
- ▲ Regulated
- △ No Forecast





What Did We Do to Prepare?

- Weekly conference calls with county emergency managers (May and June)
- Extensive snowpack monitoring and river forecasting by National Weather Service, Natural Resources Conservation Service, and Colorado Department of Natural Resources
- Extreme preparedness at the local level

A vertical strip on the left side of the slide shows a topographic map of a mountain range, likely the Sierra Nevada, with contour lines and a yellow line indicating a specific path or boundary.

Don't Be Misled by Snowpack Percentages

- Reported percent of averages have much greater meaning in April and early May
- Later cold temperatures and low snowpack melt can result in misleading messages
- Example: April 15 Avg. SWE = 40 inches
Actual SWE = 55 inches
% of Avg. = $55/40 = 138\%$



Don't Be Misled by Snowpack Percentages

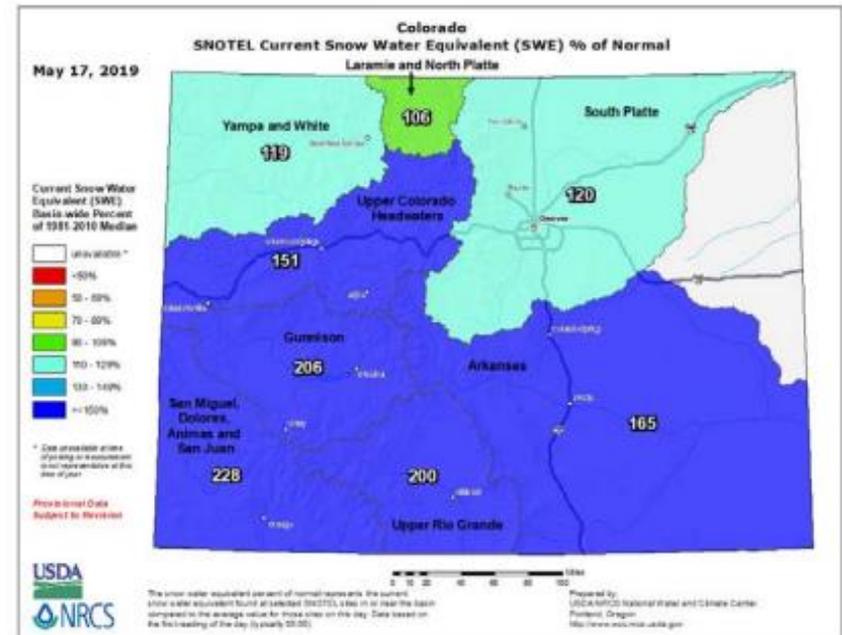
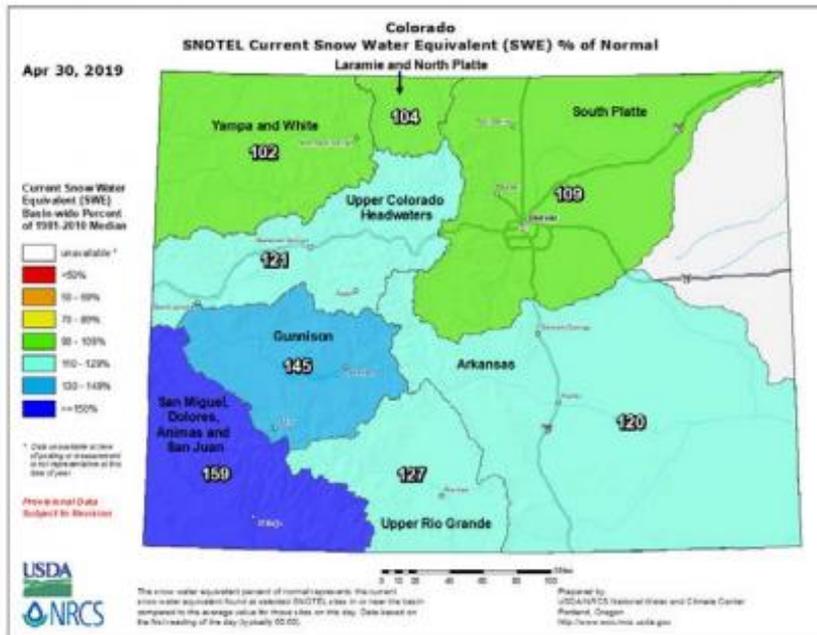
- Reported percent of averages have much greater meaning in April and early May
- Later cold temperatures and low snowpack melt can result in misleading messages
- Example: June 15 Avg. SWE = 0.8 inches
Actual SWE = 10 inches
% of Avg. = $10/0.8 = 1250\%$

Colorado Snowpack - NRCS

Basin Averages

Apr 30, 2019

May 17, 2019





What About Burn Scars?

There was flooding reported in all major recent burn scars.

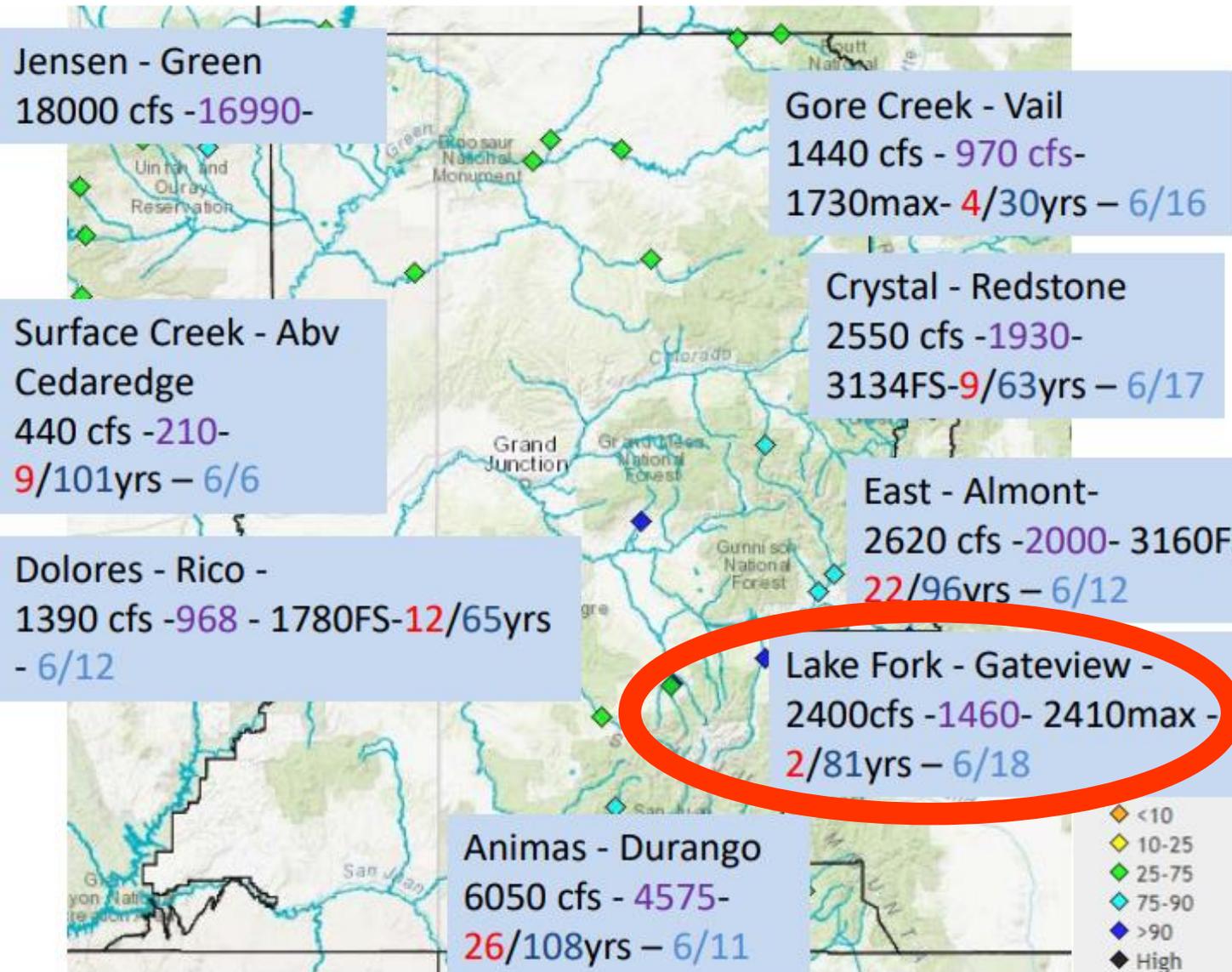
For the most part, these floods and debris flows have been less than feared by state officials.

Burn scars remain on high risk for flooding for 3-5 years after the fire

Upper Colorado Peak Forecasts (most probable)

Upper Colorado Peak Streamflow Forecasts as of **May 22, 2019**

(% of 1981-2010 average)
From the CBRFC



cfs = cubic feet per sec
FS=Flood stage

Average flow

Current Forecast Rank	Period of Record
-----------------------	------------------

National Weather Service
Grand Junction, CO

