Peak Flow Forecast Briefing

March 14, 2019

Ashley Nielson and Greg Smith
Senior Hydrologists

Colorado Basin River Forecast Center
National Weather Service
NOAA

Conference Phone #: 877-929-0660 Passcode #: 1706374

Today's Presentation

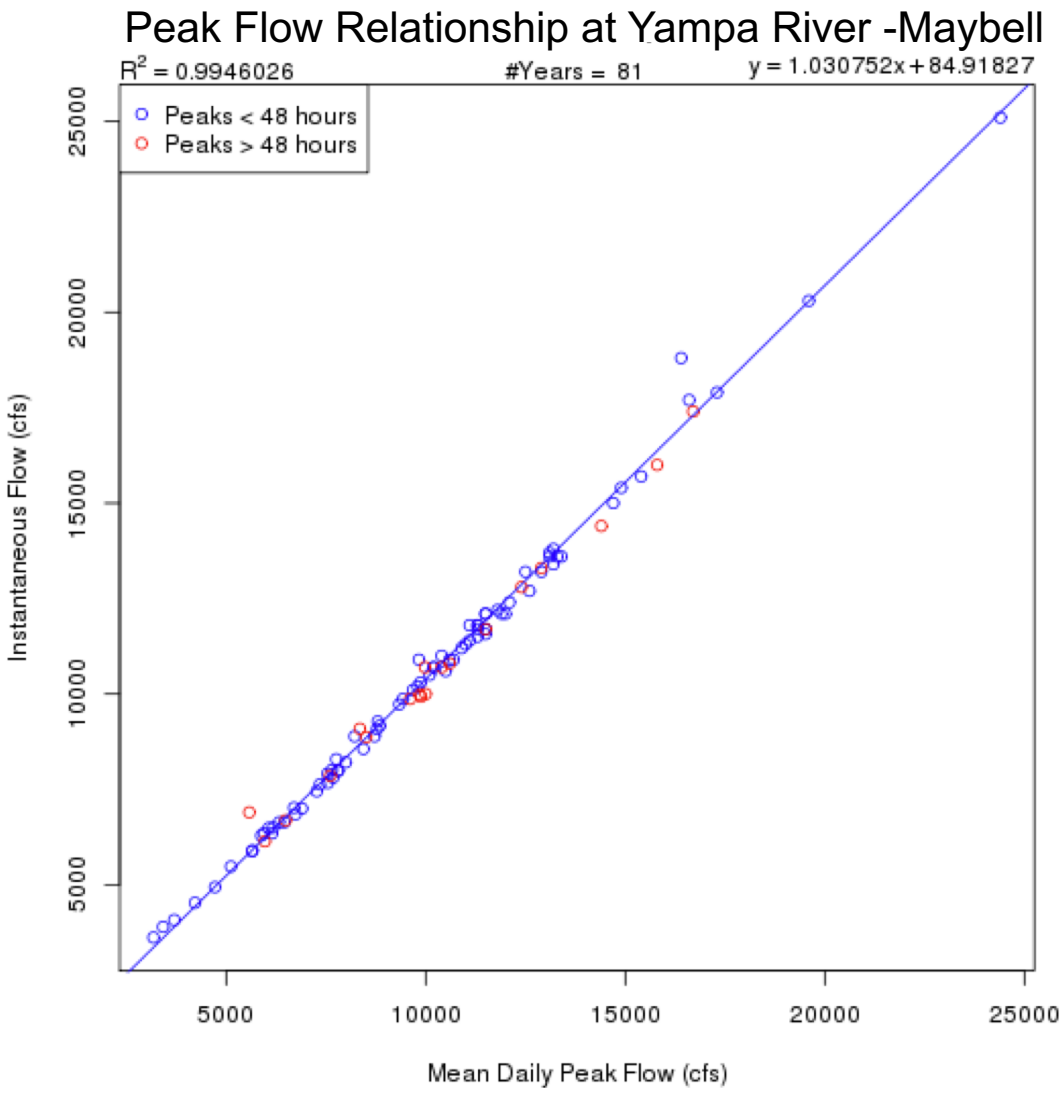
- Peak Flow Forecasts Described
  - Mean Daily Peaks
  - Instantaneous Peaks
- Peak Flow Map, Lists, & Graphics
- Current conditions driving the peak flow forecasts
- Specific peak flow forecast graphics
- Summary of flood concerns
- Spring Weather Impacts
- Upcoming Weather

What is a Peak Flow Forecast?

- Maximum Mean Daily Flow due to snowmelt
  - April-July period
- Probabilistic Forecasts
  - Exceedance Probabilities = 10%, 25%, 50%, 75%, 90%
- Regulated Flow (Downstream Points)
  - Accounts for reservoirs/diversions
  - Scheduled operations (if known), or assumptions based on past ops
- Long range outlooks of peak magnitude for specific locations
- Do not provide a specific date of the peak forecast
  - Typically only have a 5-10 day lead time for timing the peak
  - Prior to that we provide the average time period of the peak

Instantaneous Peak Flow Forecasts

- Relationship between max daily flow and instantaneous peak
- Only available for locations with good correlations & historical data
- Sites with frequent heavy rain have poor relationships



Where do I find specific peak flow forecasts?

COLORADO BASIN RIVER FORECAST CENTER

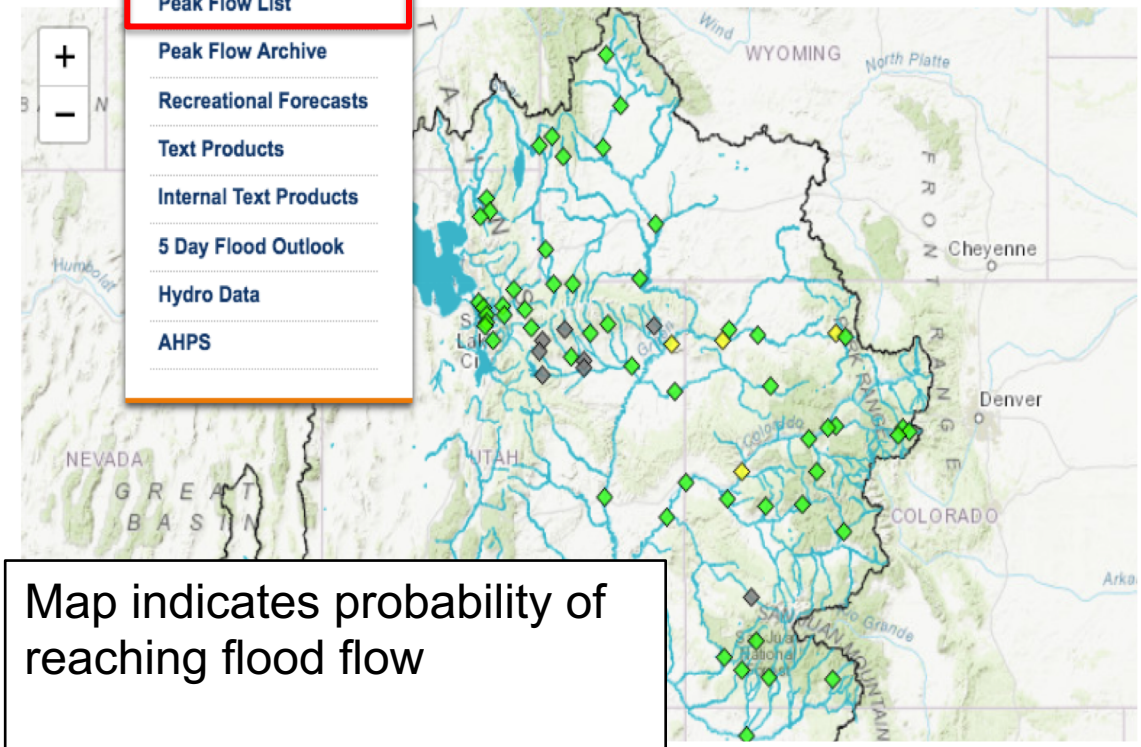
NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME | RIVERS | SNOW | WATER SUPPLY | RESERVOIRS | WEATHER | CLIMATE | HELP | ABOUT | NEWS | SEARCH

News

Water Supply Webinars More Info...
Flow Webinar More Info...

- Conditions Map
- Conditions List
- Peak Flow Map
- Peak Flow List
- Peak Flow Archive
- Recreational Forecasts
- Text Products
- Internal Text Products
- 5 Day Flood Outlook
- Hydro Data
- AHPS



www.cbrfc.noaa.gov

- River Conditions
- Snow Conditions
- Water Supply Forecasts
- Peak Flood Probablity

Forecast Date: 2019-03-01 Help

Show Hide Other Types

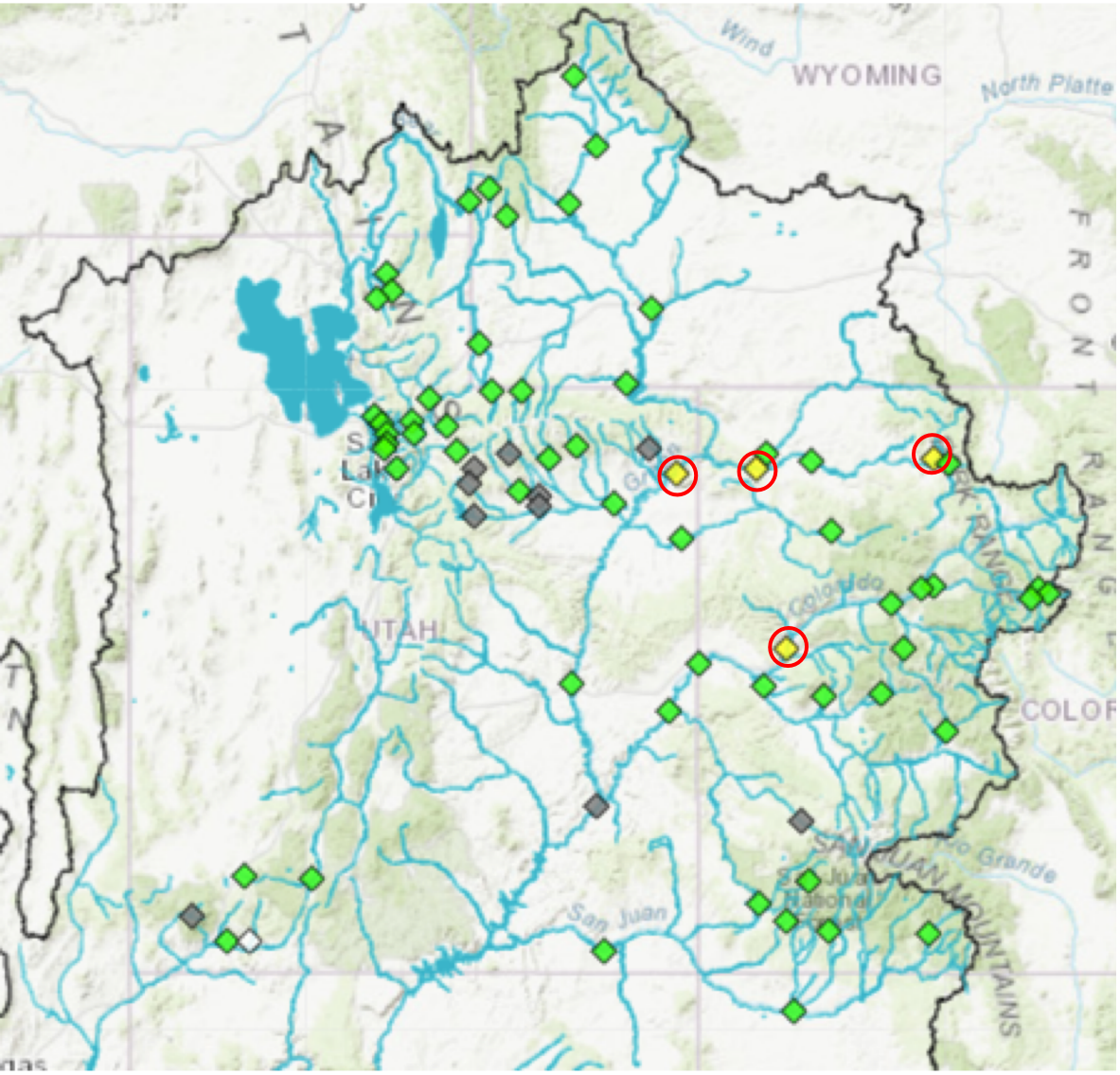
Mean Daily
Instantaneous

No Forecast
No FLood Stage
<10%
>10-25%
>25-50%
>50%

Map indicates probability of reaching flood flow

Green = Low probability
Red = High probability

Peak Flow Map – Mean Daily Peaks



Peak Flow Probability

Forecast Date: 2019-03-01

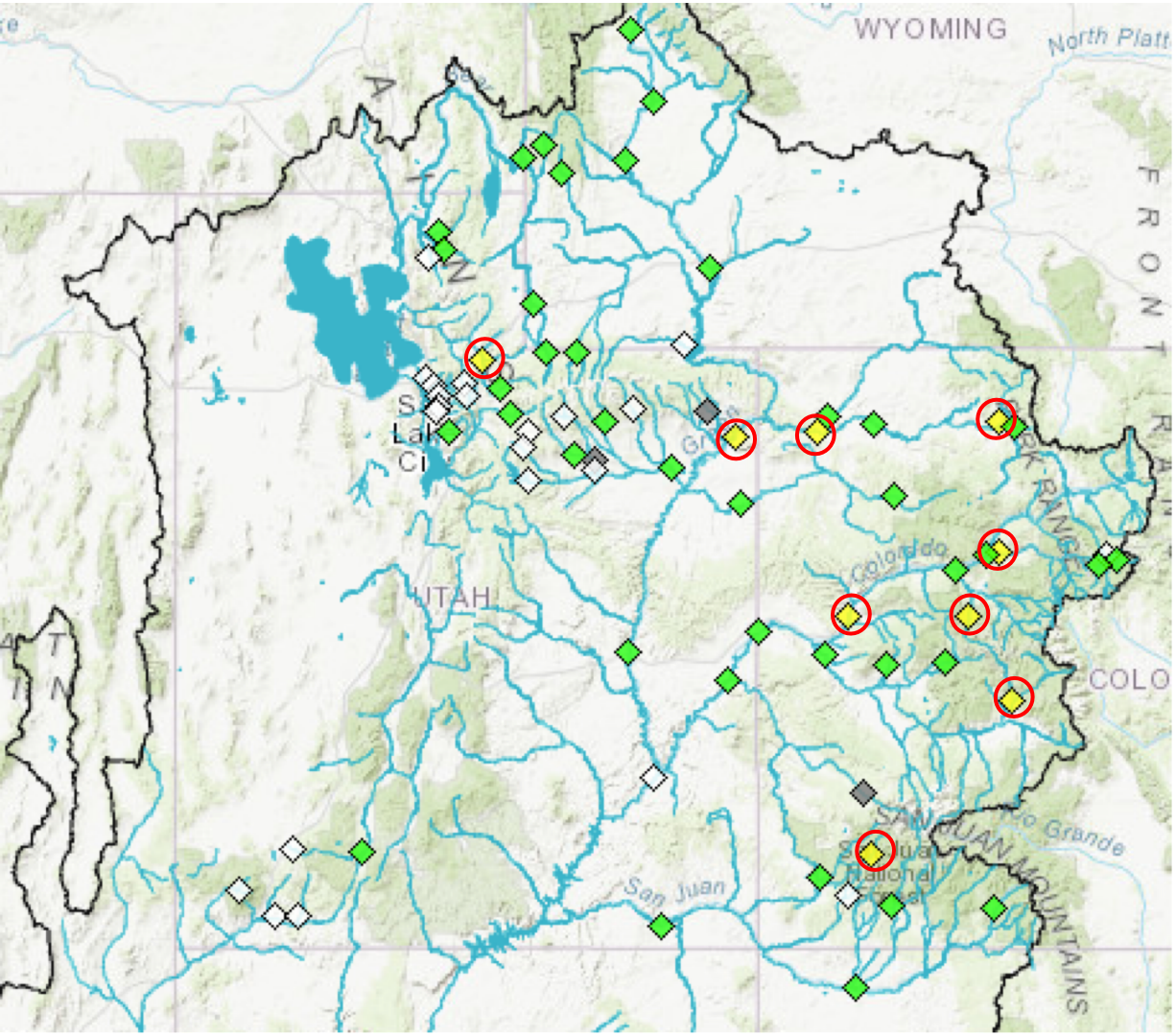
Show Hide Other Types

Mean Daily
Instantaneous

No Forecast
No FLood Stage
<10%
>10-25%
>25-50%
>50%

Elk River - Milner
Yampa – Deerlodge
Green – Jensen
Colorado – near Cameo

Peak Flow Map – Instantaneous Peaks



Peak Flow Probability

Forecast Date: 2019-03-01

Show Hide Other Types

Mean Daily
Instantaneous

No Forecast
No FLood Stage
<10%
>10-25%
>25-50%
>50%

Chalk Creek - Coalville
Elk River - Milner
Yampa – Deerlodge
Green – Jensen
Colorado – near Cameo
Eagle – below Gypsum
Crystal – near Redstone
East River – Almont
Dolores – below Rico

Peak Flow List

Peak Flow Forecast List

Help | Download Data | Requery | Rebuild Plots

Peak Flood Probability Legend

◇ No Forecast ◆ No Flood Stage ◆ <10 ◆ >10 ◆ >25 ◆ >50

Options (on/off): Mean Daily Forecasts Instantaneous Forecasts Plot

Select by Area: CBRFC Green Colorado San Juan Great Sevier Virgin Low Col

Columns (on/off): ID River Location Flood Flow PI Issue Date Observed Peak to Date Observed Date Historic Peak Hist Peak Date Average Peak Normal Earliest Date Normal Latest Date Last Year Peak Last Year Date Notes Area Sub Area DS

Click column heading to sort by that data. Click ID to view point info.

	ID	River	Location	Flood Flow	PI	Issue Date	Mean Daily 90	Mean Daily 75	Mean Daily 50	Mean Daily 25	Mean Daily 10	Inst 90	Inst 75	Inst 50	Inst 25	Inst 10	Historic Peak	Average Peak	Normal Earliest Date	Normal Latest Date	Last Year Peak	Last Year Date
1	WBRW4	Green	Daniel	8640	◆	2019-03-01	1400	1700	**2100**	2500	2800	1400	1700	2100	2600	2900	5620	2695	05-27	06-28	3680	2018-06-21
2	BPNW4	New Fork	Big Piney	8850	◆	2019-03-01	2800	3300	**4100**	5000	5500	2900	3400	4200	5200	5700	9110	4730	05-26	06-23	6020	2018-06-21
3	LABW4	Green	La Barge	10900	◆	2019-03-01	4700	5500	**7500**	9000	10000	4900	5700	7700	9200	10000	18800	8000	05-26	06-21	11000	2018-06-22
4	GRRW4	Green	Green River	11000	◆	2019-03-01	2000	3500	**5000**	7500	10000	2100	3600	5100	7600	10000	15400	5790	05-05	07-08	7550	2018-06-19
5	HMFW4	Hams Fork	Frontier	1790	◆	2019-03-01	250	350	**400**	600	800	260	370	430	640	860	2000	710	05-09	06-06	511	2018-05-12
6	BNRU1	Blacks Fork	Robertson	2550	◆	2019-03-01	750	950	**1100**	1400	1700	920	1200	1300	1700	2000	2860	1380	05-23	06-17	1350	2018-05-27
7	HFMW4	Henrys Fork	Manila	2500	◆	2019-03-01	150	250	**400**	750	900	NA	NA	NA	NA	NA	3780	750	05-10	06-26	850	2018-05-13
8	STMC2	Yampa	Steamboat Springs	5930	◆	2019-03-01	2100	2700	**3200**	3800	5000	2400	3000	3500	4200	5400	5870	3070	05-19	06-10	2530	2018-05-27
9	ENMC2	Elk	Milner	5920	◇	2019-03-01	2600	3300	**3700**	5000	6000	3000	3700	4200	5600	6700	7000	3865	05-17	06-03	2840	2018-05-12
10	MBLC2	Yampa	Maybell	21200	◆	2019-03-01	7000	8500	**10000**	12500	16000	7300	8800	10000	13000	17000	24400	10300	05-12	06-05	7020	2018-05-13
11	LILC2	Little Snake	Lily	15100	◆	2019-03-01	2500	3500	**4000**	5000	7000	2800	4000	4500	5600	7900	13400	4320	05-03	06-04	1830	2018-05-14
12	YDLC2	Yampa	Deerlodge Park	20650	◇	2019-03-01	9000	11500	**13500**	16500	22000	9400	12000	14000	17000	23000	32300	13470	05-11	06-04	8690	2018-05-14
13	WRMC2	White	Meeker	8510	◆	2019-03-01	2000	2400	**2800**	3500	4200	2200	2600	3000	3800	4500	6320	3040	05-17	06-09	1750	2018-05-12

Peak Flow List

Peak Flow Forecast List

Help | Download Data | Requery | Rebuild Plots

Peak Flood Probability Legend

◇ No Forecast ◆ No Flood Stage ◆ <10 ◆ >10 ◆ >25 ◆ >50

Options (on/off): Mean Daily Forecasts Instantaneous Forecasts Plot

Select by Area: CBRFC Green Colorado San Juan Great Sevier Virgin Low Col

Columns (on/off): ID River Location Flood Flow PI Issue Date Observed Peak to Date Observed Date Historic Peak Hist Peak Date Average Peak Normal Earliest Date Normal Latest Date Last Year Peak Last Year Date Notes Area Sub Area DS

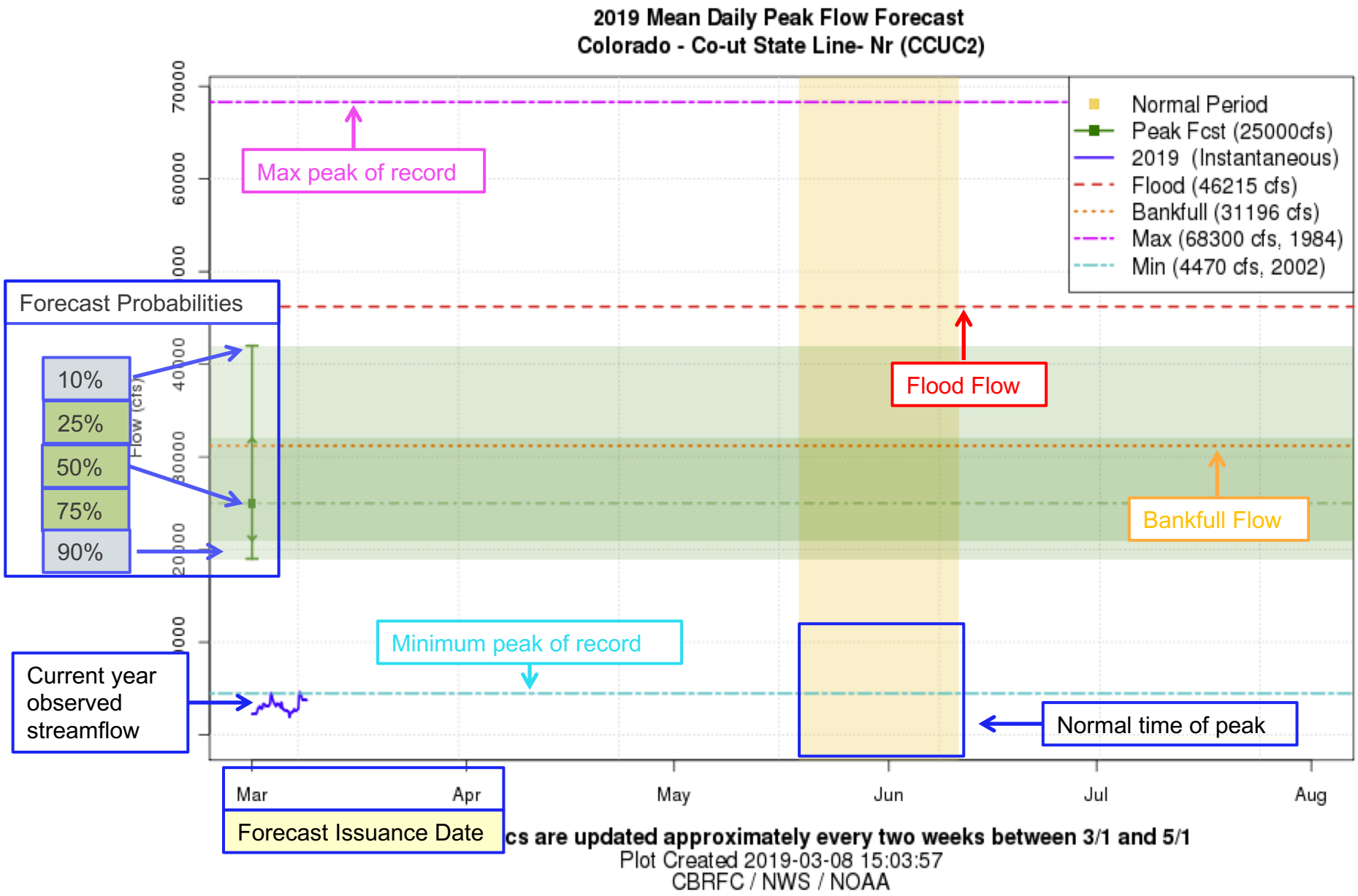
Click column heading to sort by that data. Click ID to view point info.

	ID	River	Location	Flood Flow	PI	Issue Date	Mean Daily 90	Mean Daily 75	Mean Daily 50	Mean Daily 25	Mean Daily 10	Inst 90	Inst 75	Inst 50	Inst 25	Inst 10	Historic Peak	Average Peak	Normal Earliest Date	Normal Latest Date	Last Year Peak	Last Year Date
1	JESU1	Green	Jensen	24100	◇	2019-03-01	12500	15000	**17000**	21000	27000	13000	15000	18000	22000	28000	38500	16990	05-11	06-07	12100	2018-05-31
2	ENMC2	Elk	Milner	5220	◇	2019-03-01	2600	3300	**3700**	5000	6000	3000	3700	4200	5600	6700	7000	3865	05-17	06-03	2840	2018-05-12
3	YDLC2	Yampa	Deerlodge Park	20650	◇	2019-03-01	9000	11500	**13500**	16500	22000	9400	12000	14000	17000	23000	32300	13470	05-11	06-04	8690	2018-05-14
4	CAMC2	Colorado	C			2019-03-01	10500	12500	**16000**	21000	28000							17000	05-24	06-12	6650	2018-05-19
5	TADU1	Duchesne	Tabiona	2600	◆	2019-03-01	500	700	**900**	1100	13							925	05-14	06-12	165	2018-05-18
6	YLLU1	Yellowstone	Altonah	2200	◆	2019-03-01	600	750	**900**	1100	13							950	05-22	06-16	560	2018-05-27
7	NEUU1	Uinta	Neola	3880	◆	2019-03-01	650	850	**1100**	1400	1650	NA	NA	NA	NA	NA	3000	1245	05-15	06-11	439	2018-05-27
8	DURU1	Duchesne	Randlett	6220	◆	2019-03-01	900	1300	**2300**	4000	5000	1300	1700	2700	4400	5400	8450	3070	04-29	06-28	298	2018-04-10
9	GRVU1	Green	Green River	36400	◆	2019-03-01	15000	18000	**21000**	27000	35000	15000	18000	21000	27000	36000	47200	21700	05-16	06-11	12700	2018-06-03
10	WBRW4	Green	Daniel	8640	◆	2019-03-01	1400	1700	**2100**	2500	2800	1400	1700	2100	2600	2900	5620	2695	05-27	06-28	3680	2018-06-21
11	BPNW4	New Fork	Big Piney	8850	◆	2019-03-01	2800	3300	**4100**	5000	5500	2900	3400	4200	5200	5700	9110	4730	05-26	06-23	6020	2018-06-21
12	LABW4	Green	La Barge	10900	◆	2019-03-01	4700	5500	**7500**	9000	10000	4900	5700	7700	9200	10000	18800	8000	05-26	06-21	11000	2018-06-22
13	GRRW4	Green	Green River	11000	◆	2019-03-01	2000	3500	**5000**	7500	10000	2100	3600	5100	7600	10000	15400	5790	05-05	07-08	7550	2018-06-19
14	HMFW4	Hams Fork	Frontier	1790	◆	2019-03-01	250	350	**400**	600	800	260	370	430	640	860	2000	710	05-09	06-06	511	2018-05-12

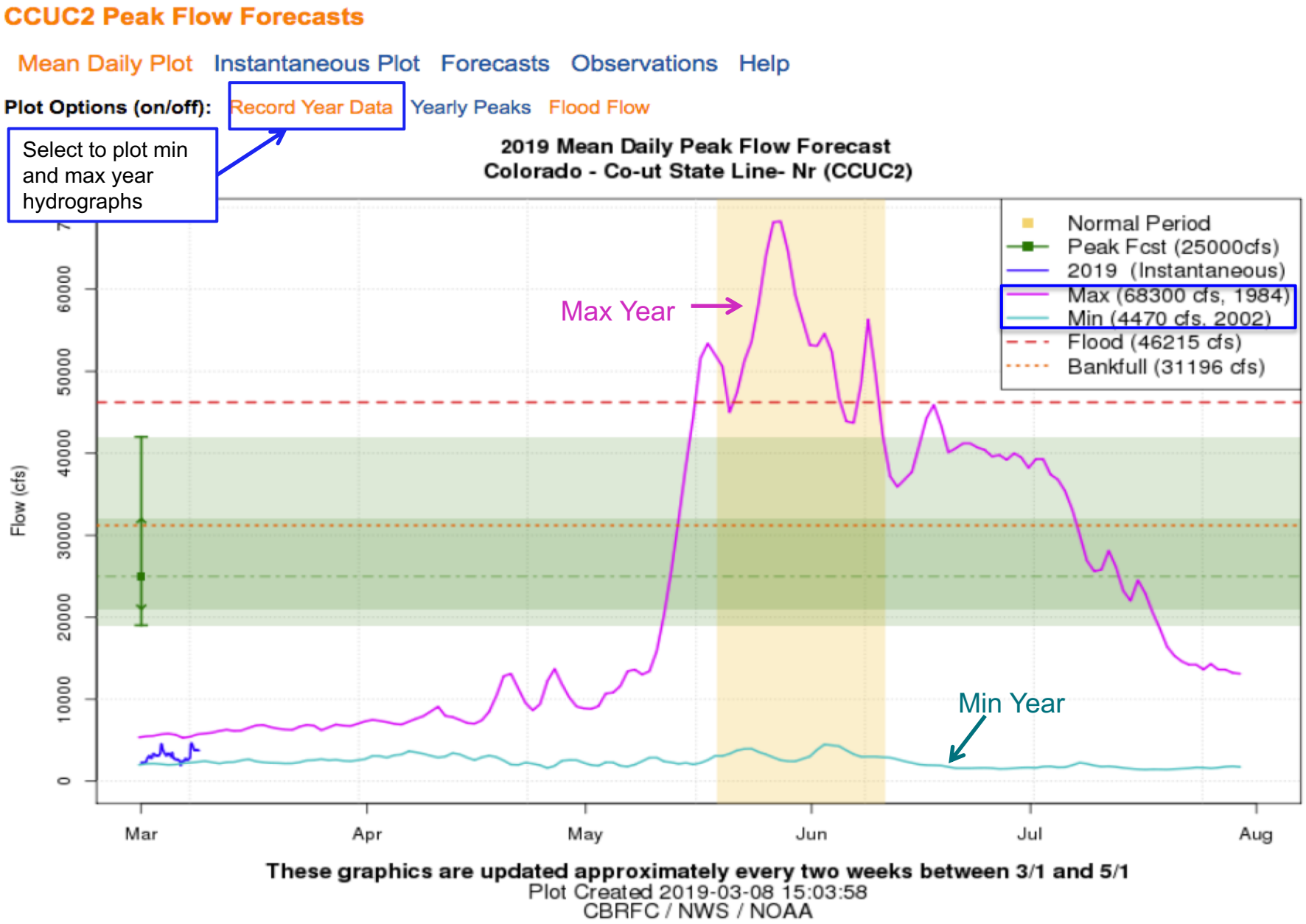
flood level

10% mean daily and instantaneous forecast exceed flood level

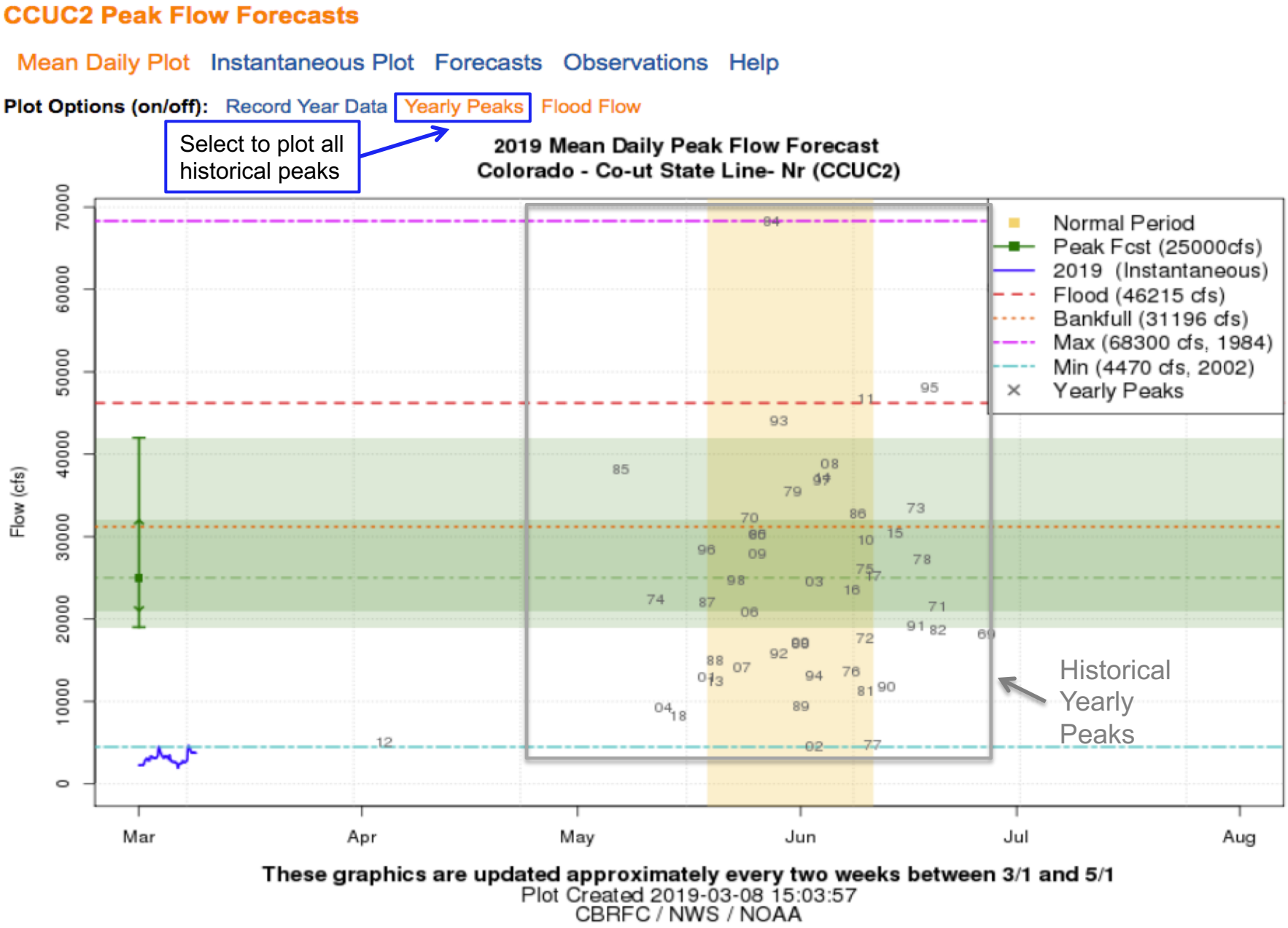
Peak Flow Graphic



Peak Flow Graphic



Peak Flow Graphic

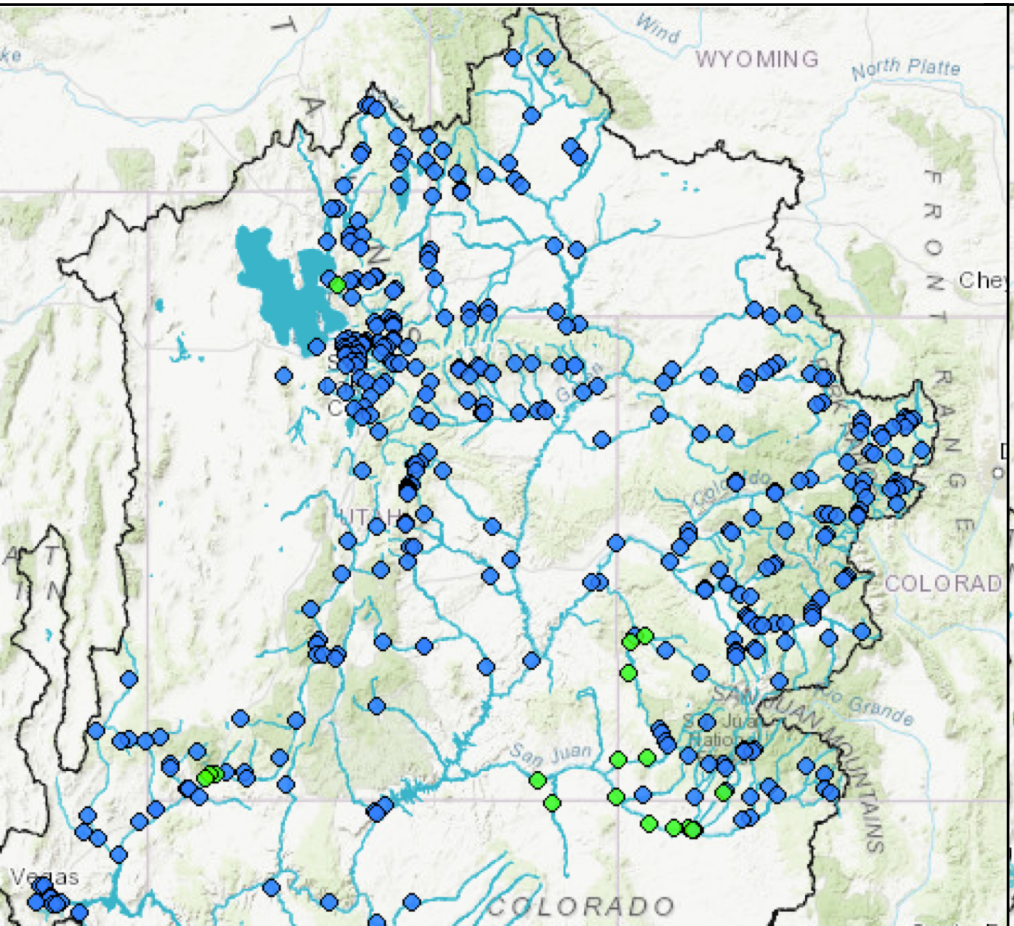


Significance of Peak Flow Forecast Points: They are a subset of our modeled daily river forecast points. The daily model becomes increasingly important when runoff begins.

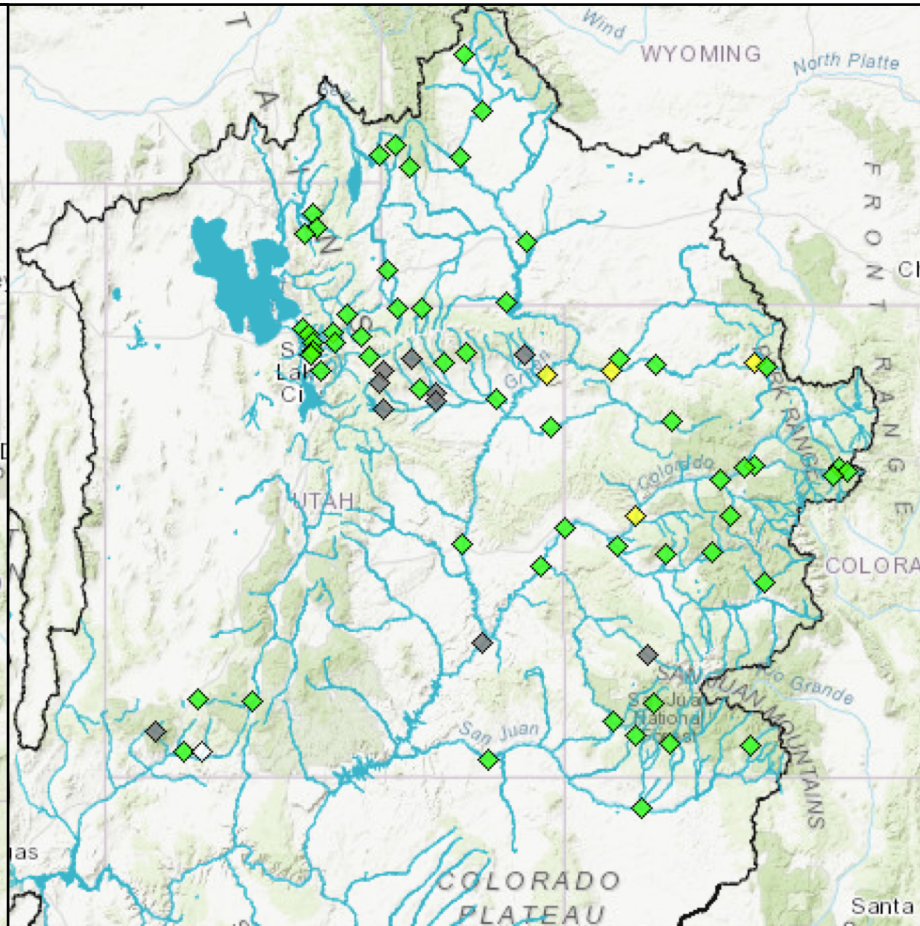
Many peak flow forecast points were originally developed with recreation interests in mind
Most sites also have established flood stages and provide some flood threat information

Peak flow forecast points alone are not a comprehensive summary of any flood threat.

Modeled River Forecast Points

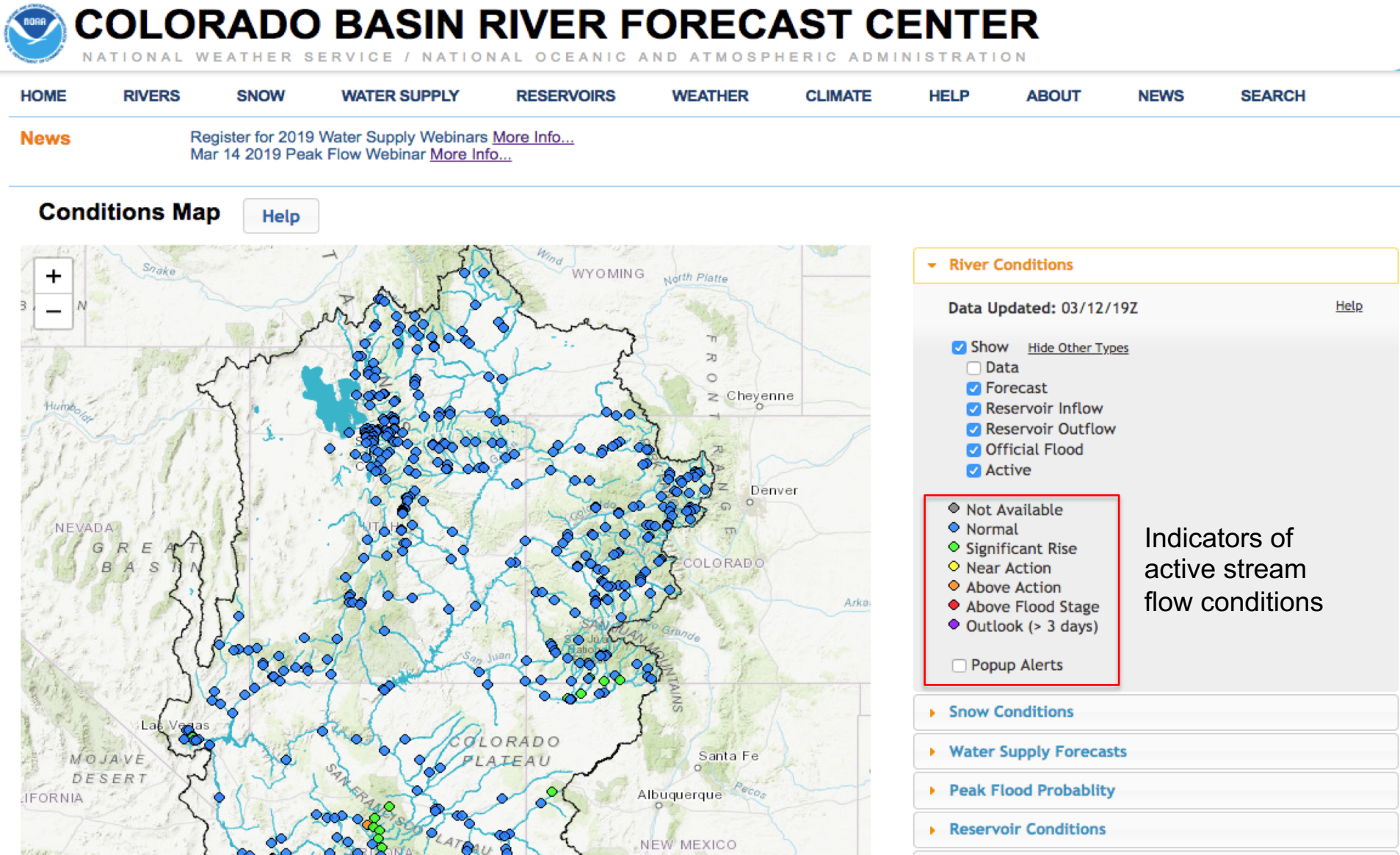


Peak Flow Points

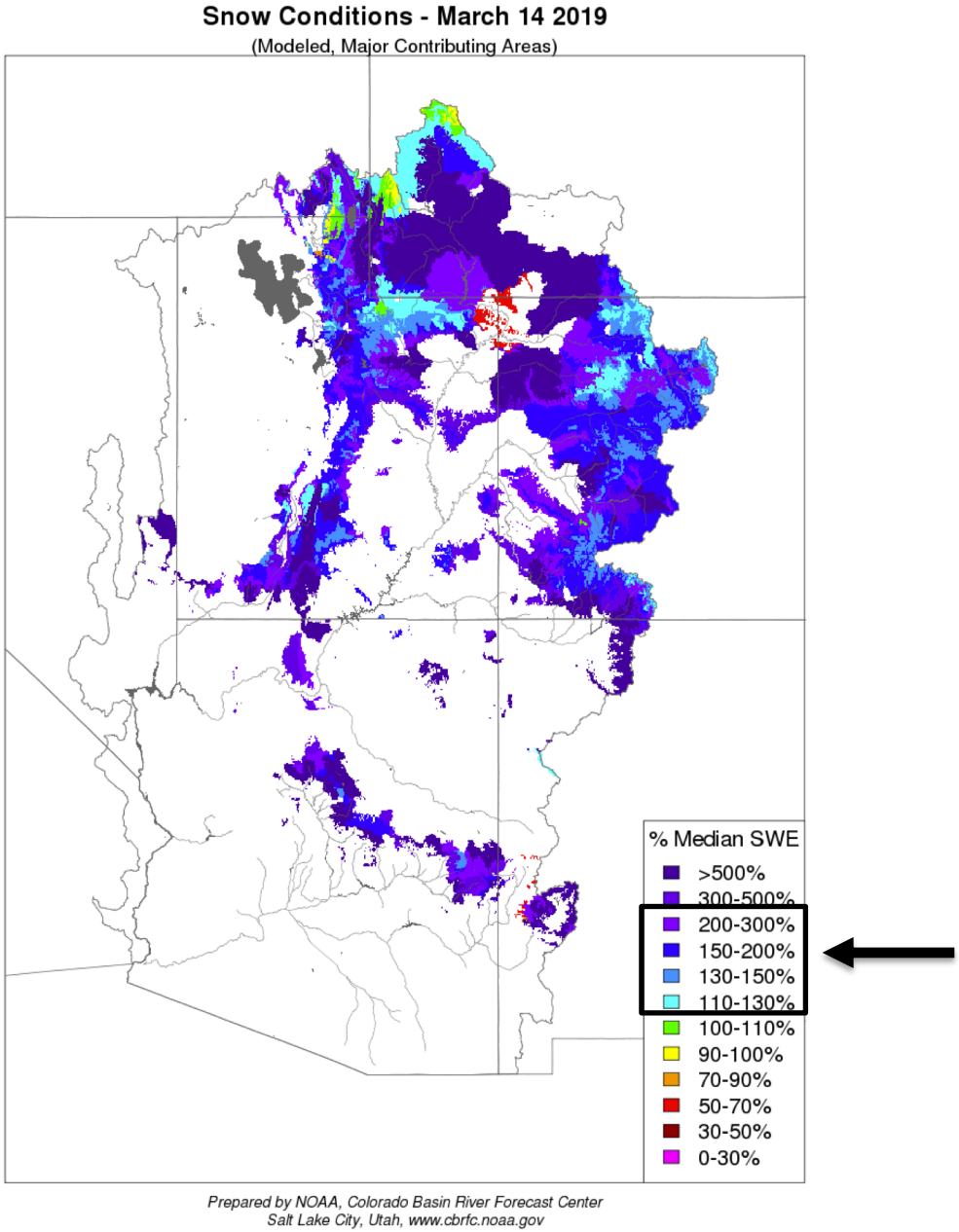


CBRFC Main Web Page

Daily deterministic / Daily operational model output is available from the CBRFC main web page: www.cbrfc.noaa.gov

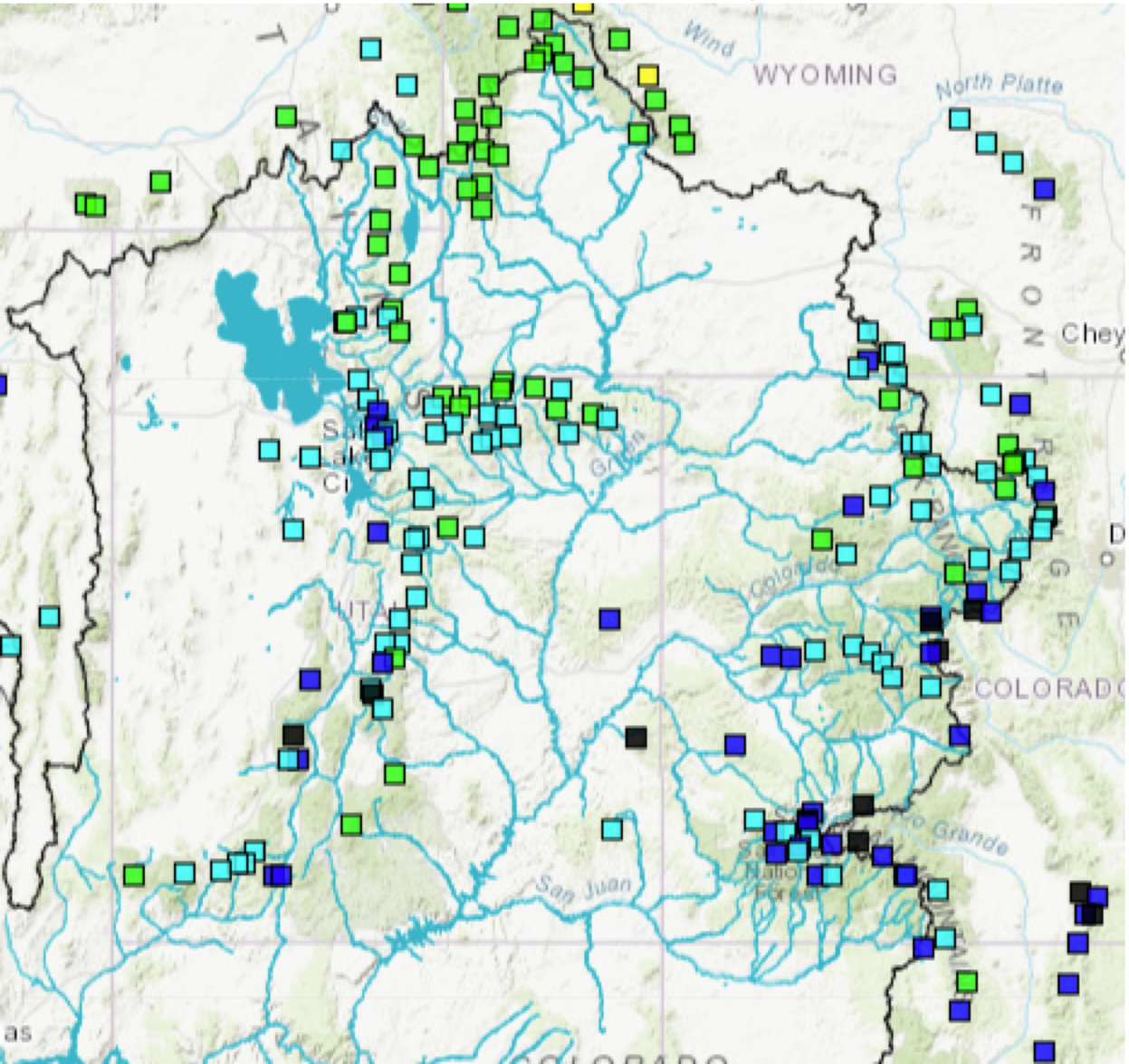


Current conditions impacting peaks: Model Snow Conditions



Snow Conditions: SNOTEL Ranking as of 3/14/2019

Those in black are the highest on record for this date
Most in dark blue are the 2nd or 3rd highest on record for this date

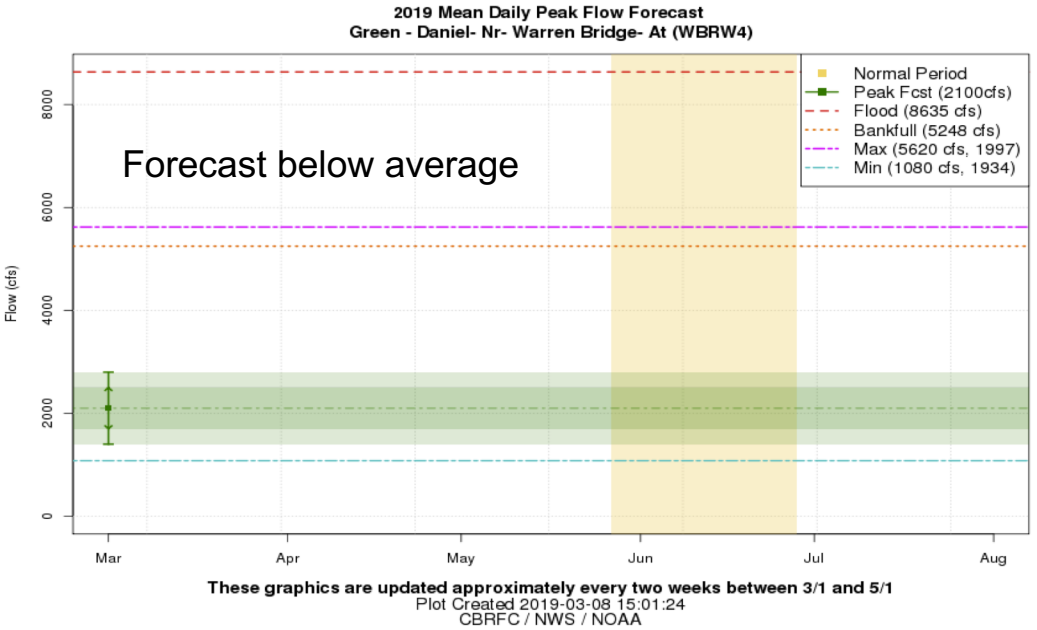


- Percentiles
- Percent Average
- Percent Median

- No Data
- Low
- <10
- 10-25
- 25-75
- 75-90
- >90
- High

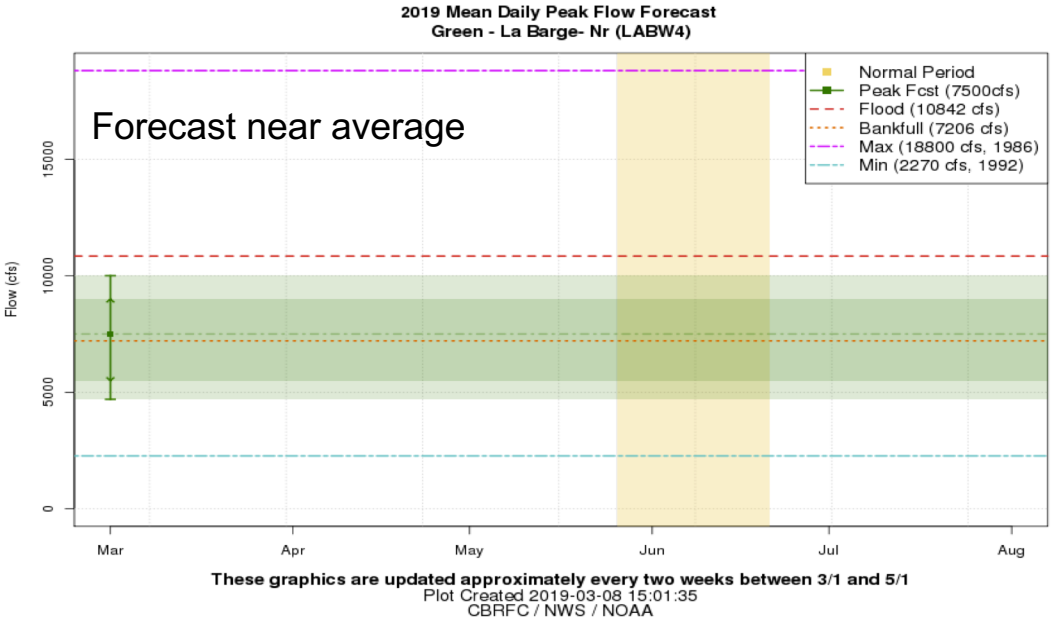
Period of record
33-41 years

Green River Basin – Upper Green



Green River – Warren Bridge

Forecast:	**2100 CFS**
Average:	2700 CFS
Flood:	8600 CFS
Last Year:	3680 CFS
Max of Record:	5620 CFS

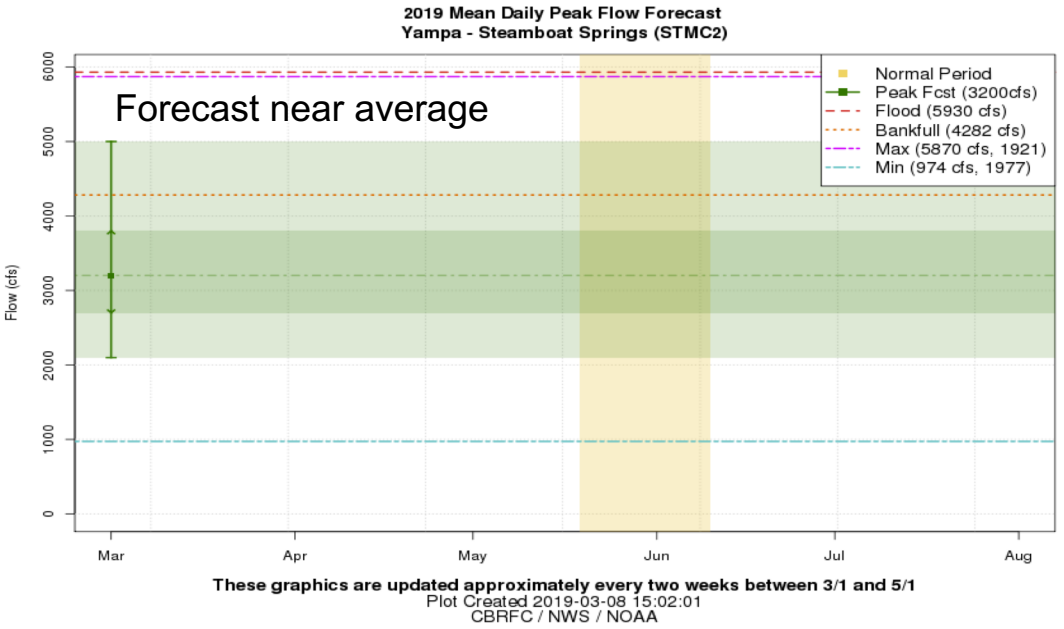


Green River - Labarge, WY

Forecast:	**7500 CFS**
Average:	8000 CFS
Flood:	10900 CFS
Last Year:	11000 CFS
Max of Record:	18800 CFS

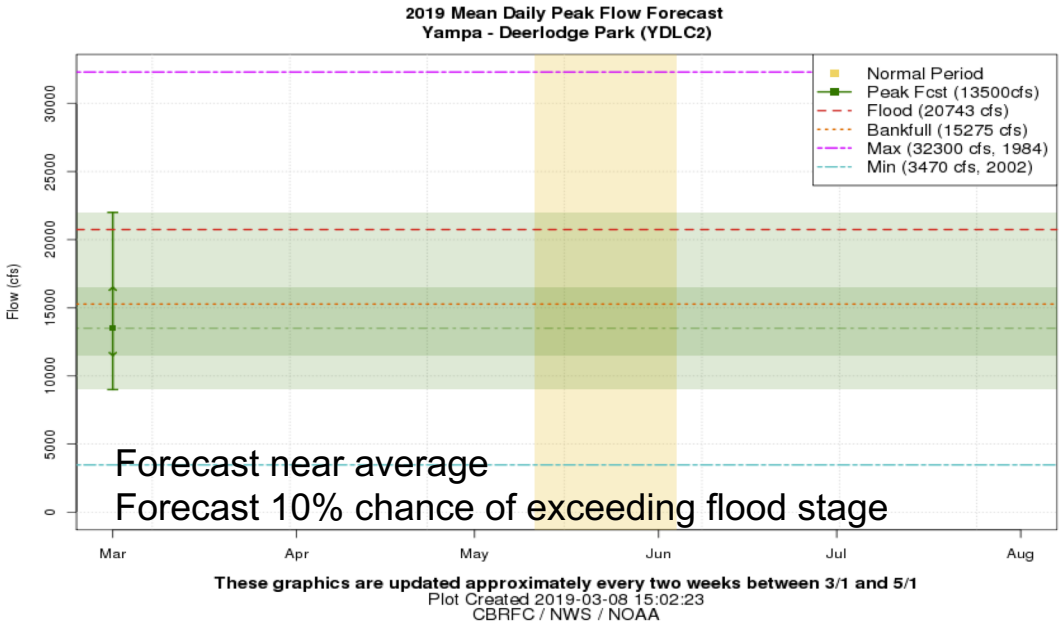
Forecasts are 50% Exceedance

Yampa River Basin



Yampa River-Steamboat Springs

Forecast:	**3200 CFS**
Average:	3070 CFS
Flood:	5930 CFS
Last Year:	2530 CFS

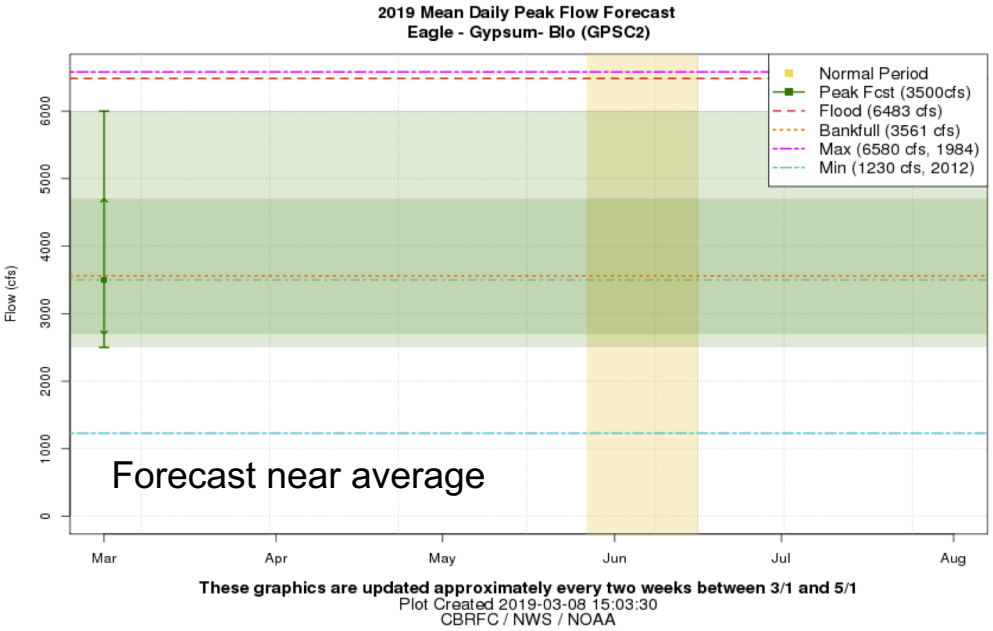


Yampa River - Deerlodge

Forecast:	**13500 CFS**
Average:	13500 CFS
Flood:	20600 CFS
Last Year:	8690 CFS

Forecasts are 50% Exceedance

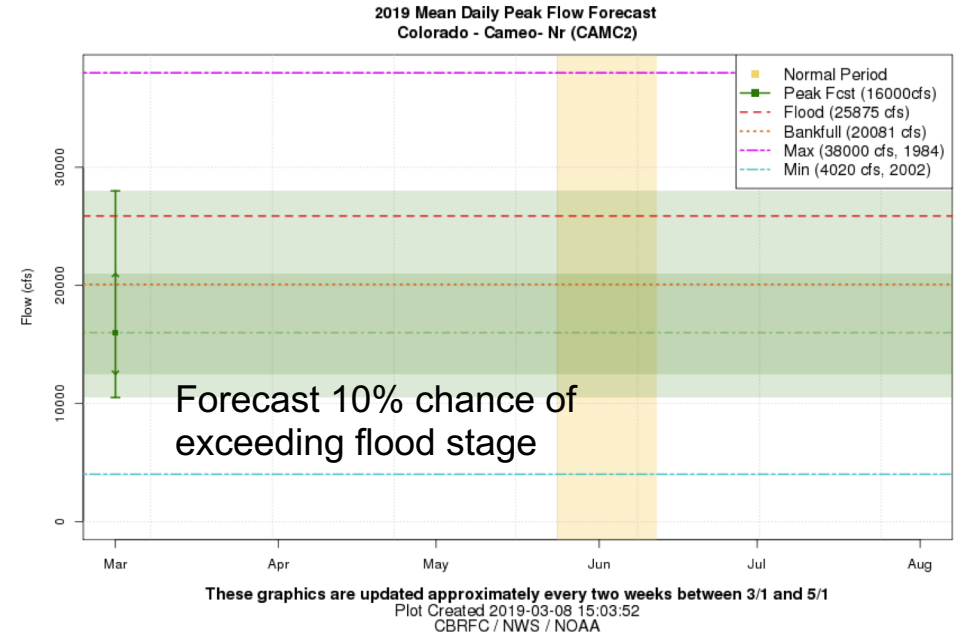
Upper Colorado River Basin



Eagle River - Gypsum

Forecast:	**3500 CFS**
Average:	3600 CFS
Flood:	6500 CFS
Last Year:	1920 CFS

Impacted by regulation



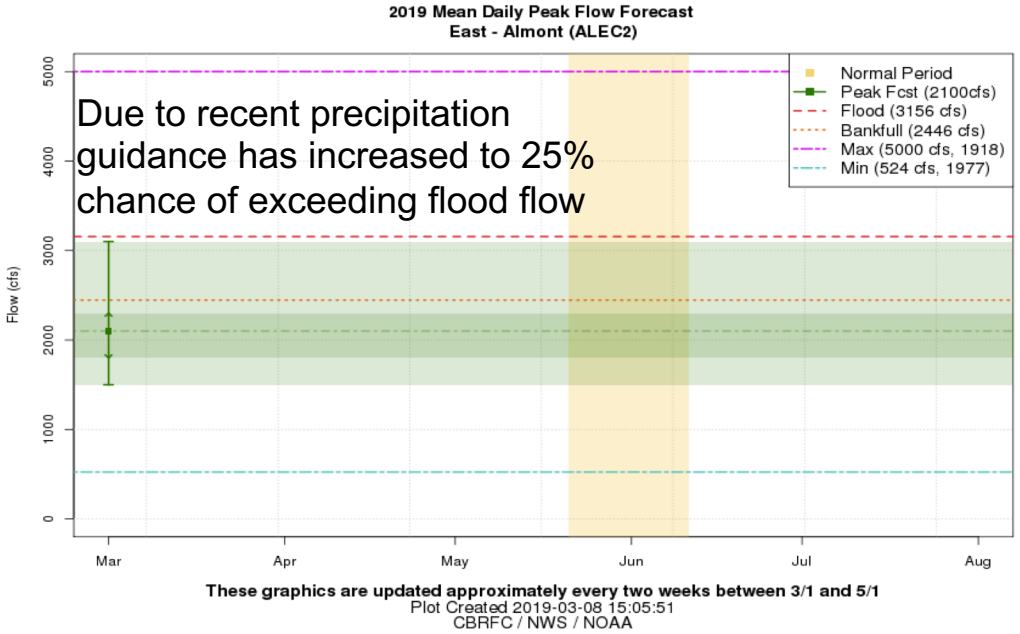
Colorado River - Cameo

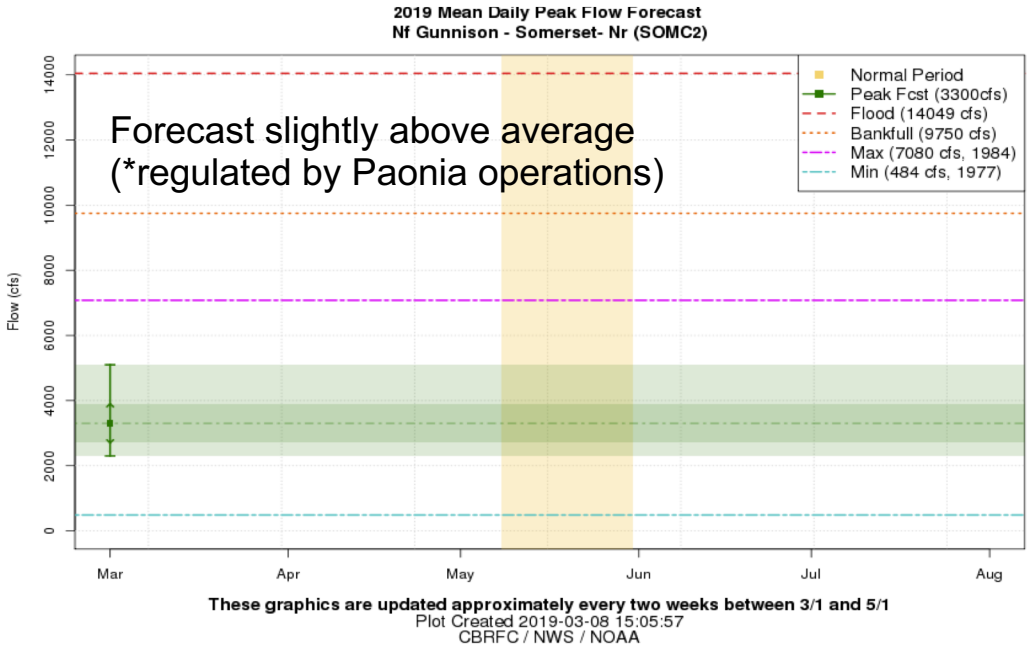
Forecast:	**16000 CFS**
Average:	17000 CFS
Flood:	26000 CFS
Last Year:	6650 CFS

Impacted by regulation

Forecasts are 50% Exceedance

Gunnison River Basin





East River - Almont

Forecast:	**2100 CFS**
Average:	2000 CFS
Flood:	3160 CFS
Last Year:	820 CFS

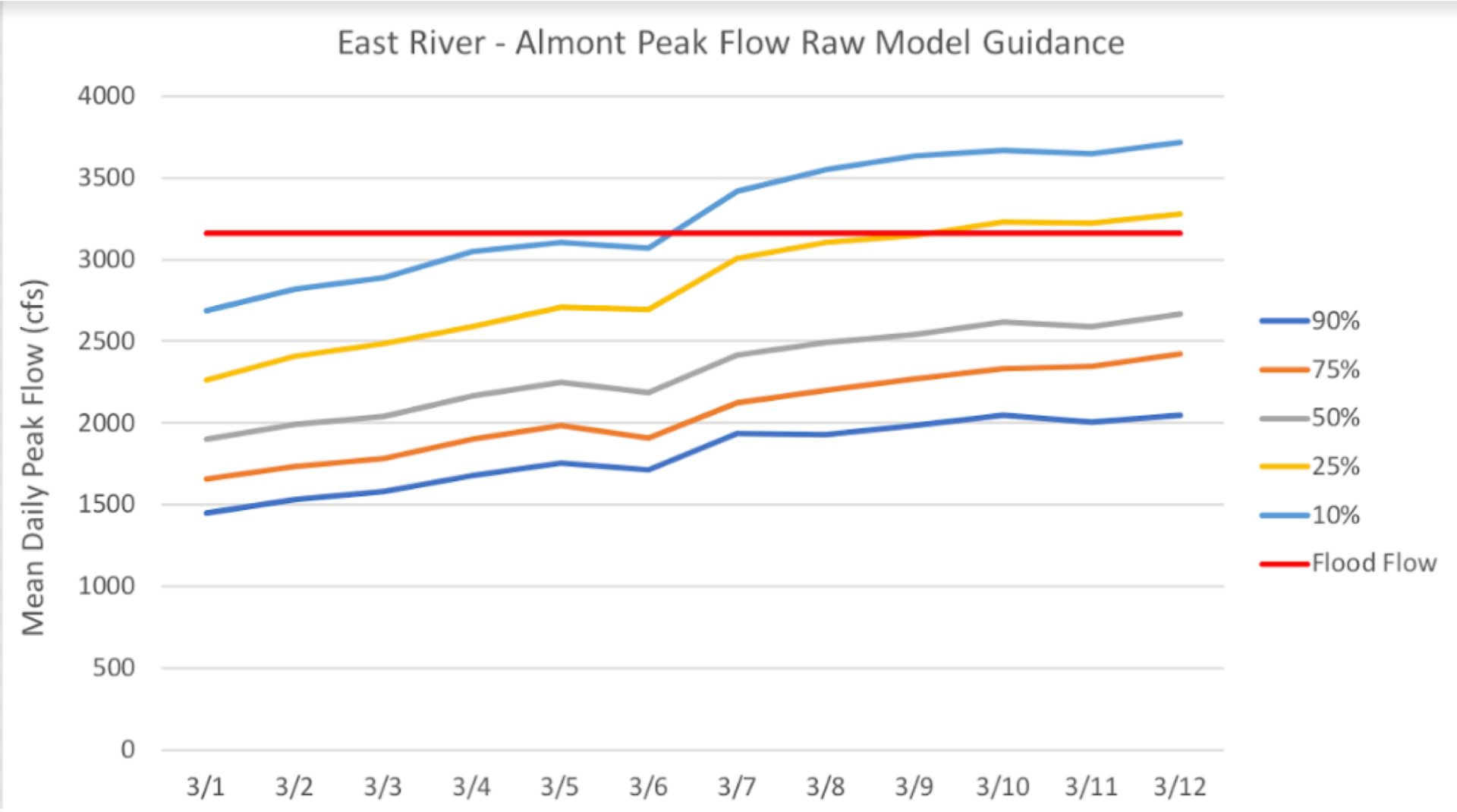
NF Gunnison - Somerset

Forecast:	**3300 CFS**
Average:	3120 CFS
Flood:	14000 CFS
Last Year:	1320 CFS

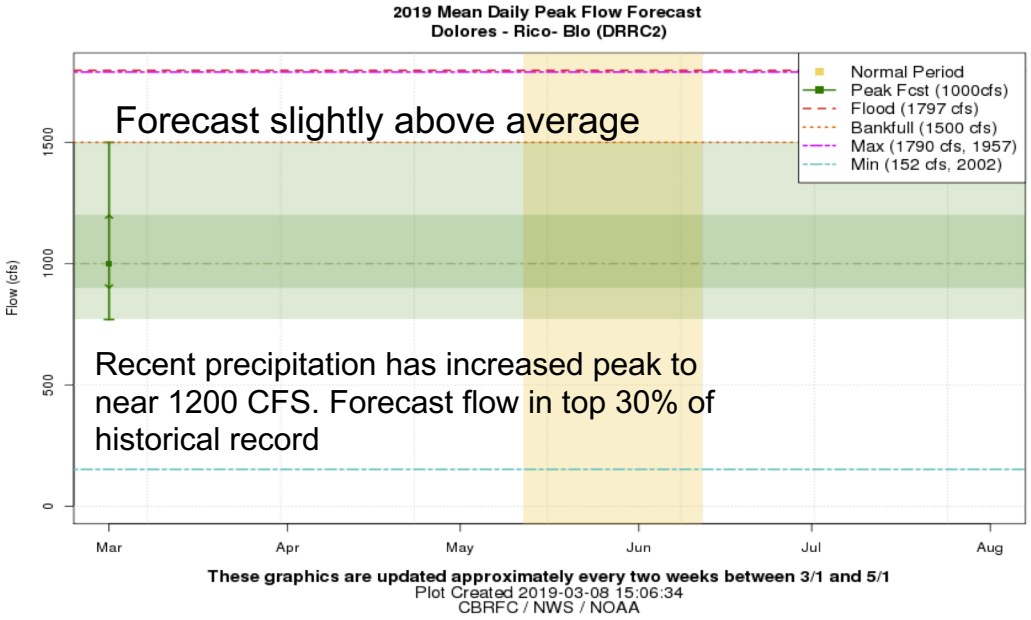
Forecasts are 50% Exceedance

Gunnison River Basin

How guidance changed categorically over just 10 days

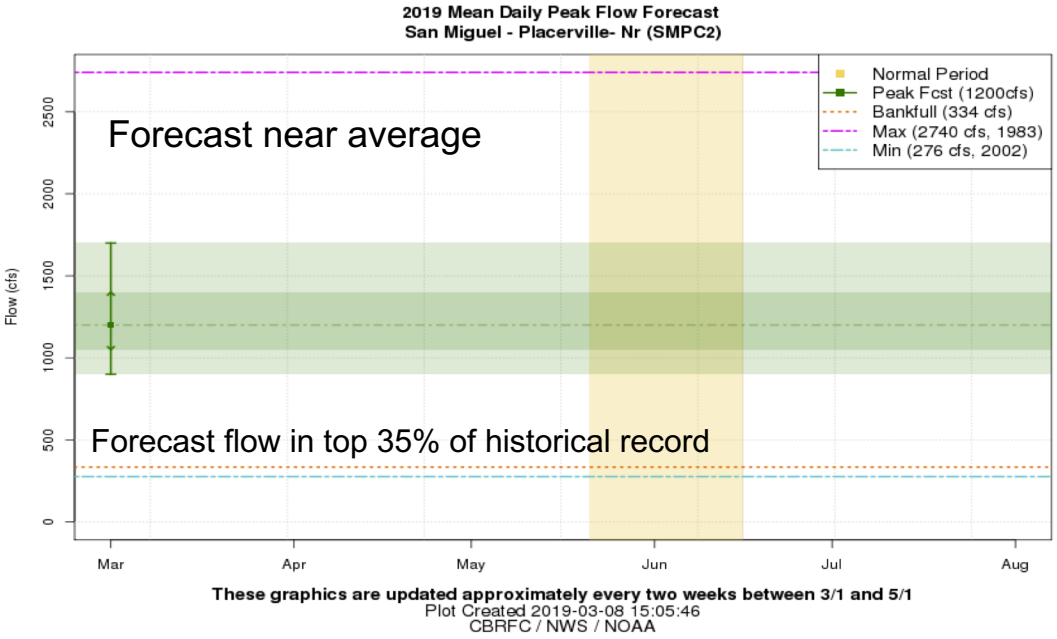


Dolores River Basin



Dolores- Rico

Forecast:	**1000 CFS**
Average:	970 CFS
Flood:	1790 CFS
Last Year:	320 CFS



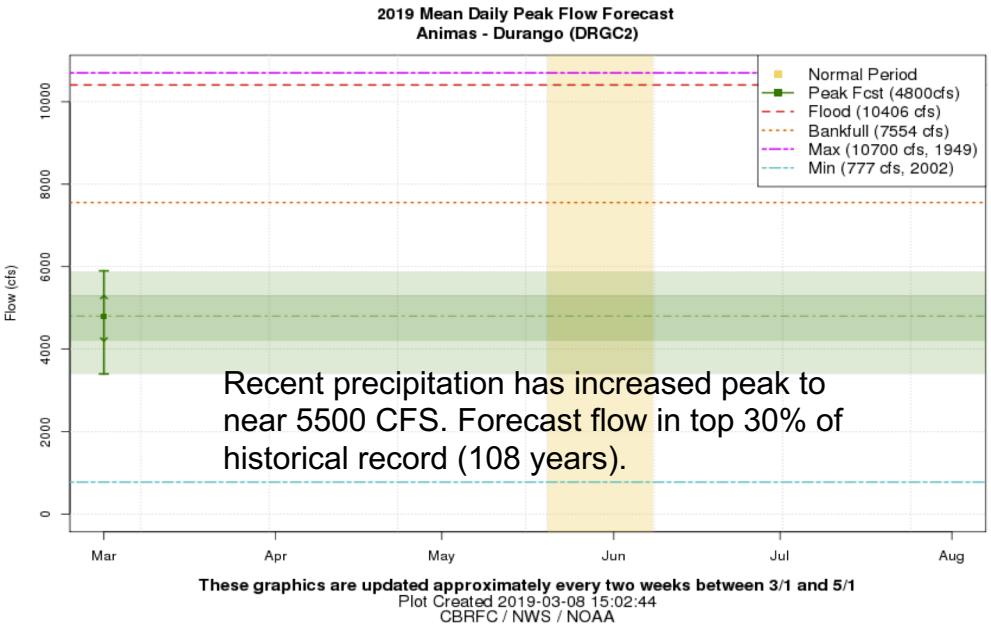
San Miguel- Placerville

Forecast:	**1200 CFS**
Average:	1260 CFS
Flood:	*3190 CFS
Last Year:	380 CFS

* Previous gage location

Forecasts are 50% Exceedance

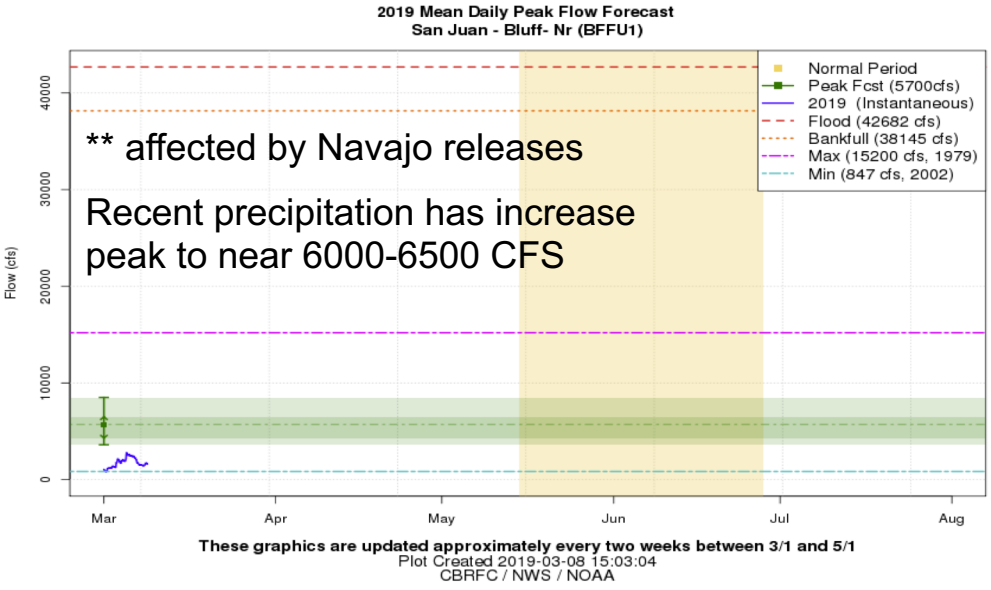
San Juan River Basin



Animas River - Durango

Forecast:	**4800 CFS**
Average:	4600 CFS
Flood:	10400 CFS
Last Year:	1680 CFS

Hit current flood level only once in the April-July period.



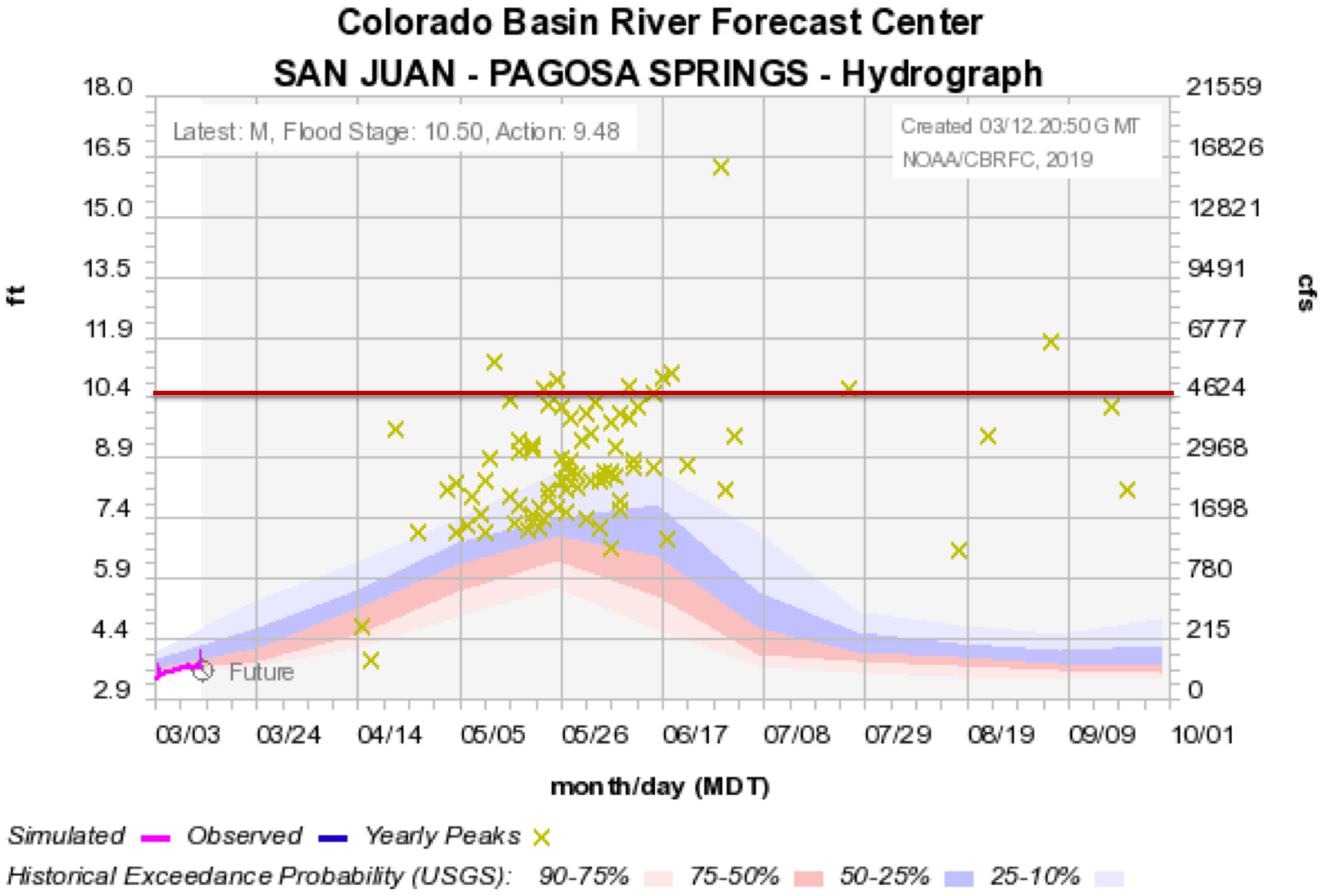
San Juan River - Bluff

Forecast:	**5700 CFS**
Average:	7340 CFS
Flood:	42680 CFS
Last Year:	1380 CFS

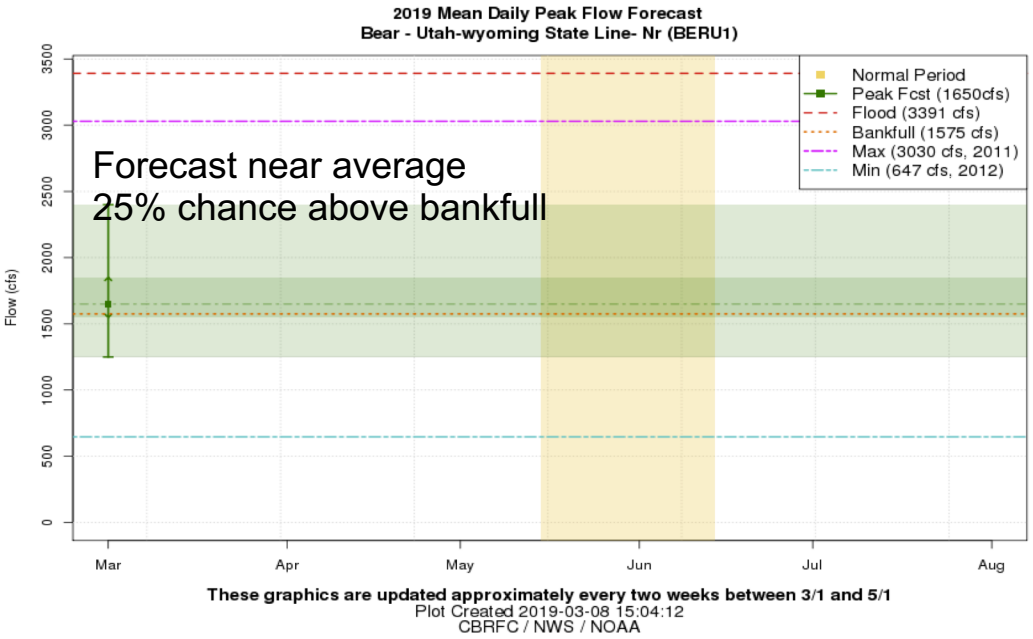
Forecasts are 50% Exceedance

San Juan River Basin

Flood flows in the San Juan usually take a rainfall component

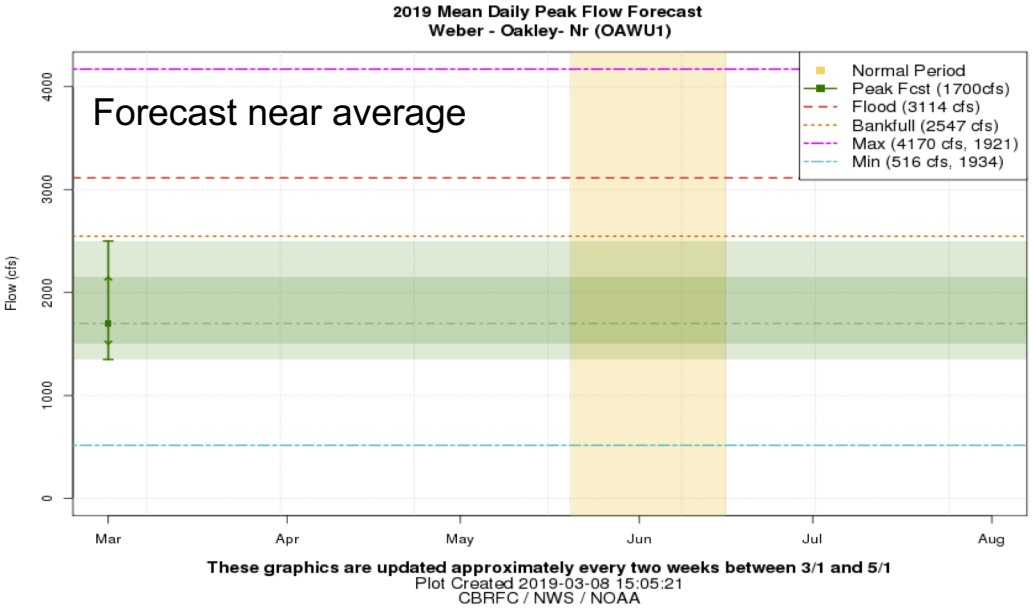


Great Basin – Bear / Weber Basins



Bear River – UT / WY Stateline

Forecast:	**1650 CFS**
Average:	1600 CFS
Flood:	**3400 CFS**
Last Year:	1060 CFS

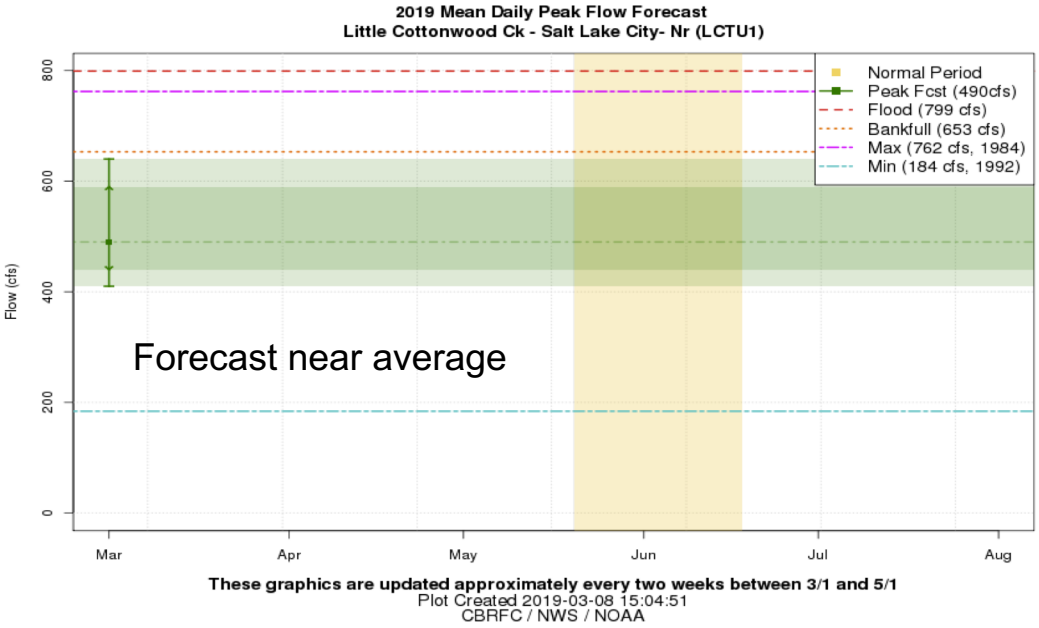


Weber River - Oakley

Forecast:	**1700 CFS**
Average:	1650 CFS
Flood:	**3100 CFS**
Last Year:	810 CFS

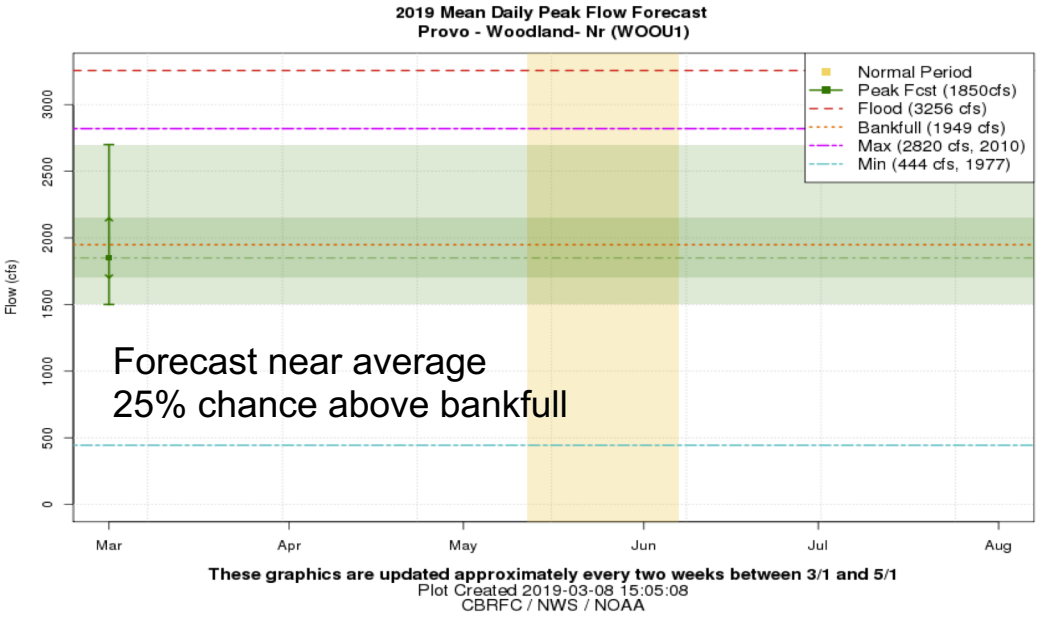
Forecasts are 50% Exceedance

Great Basin – Six Creeks / Provo Basins



Little Cottonwood - SLC

Forecast:	**490 CFS**
Average:	460 CFS
Flood:	800 CFS
Last Year:	220 CFS

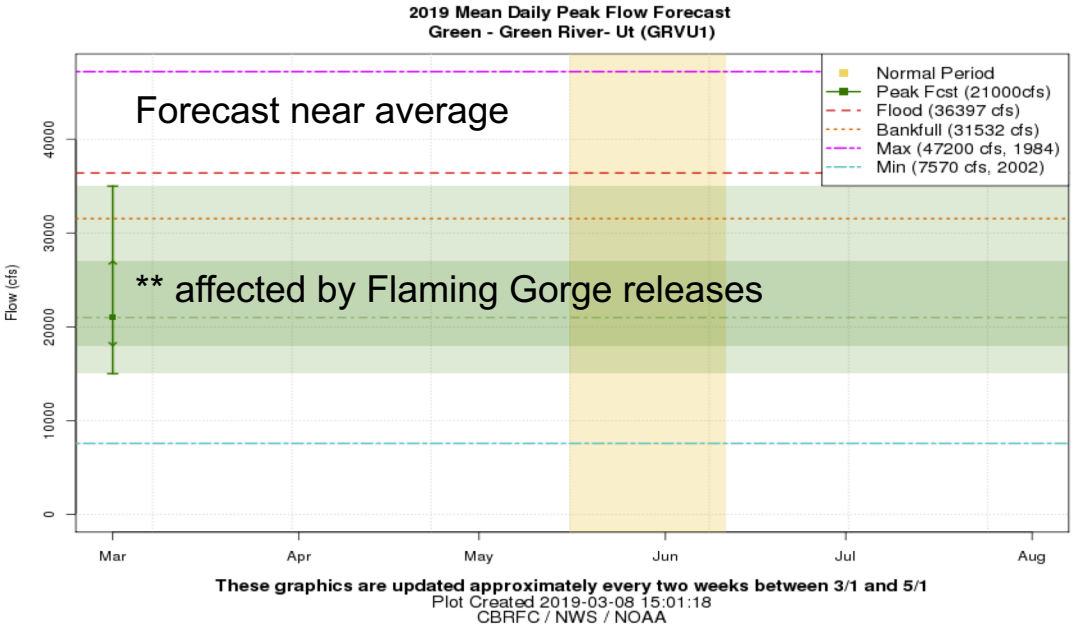


Provo River - Woodland

Forecast:	**1850 CFS**
Average:	1800 CFS
Flood:	3250 CFS
Last Year:	1310 CFS

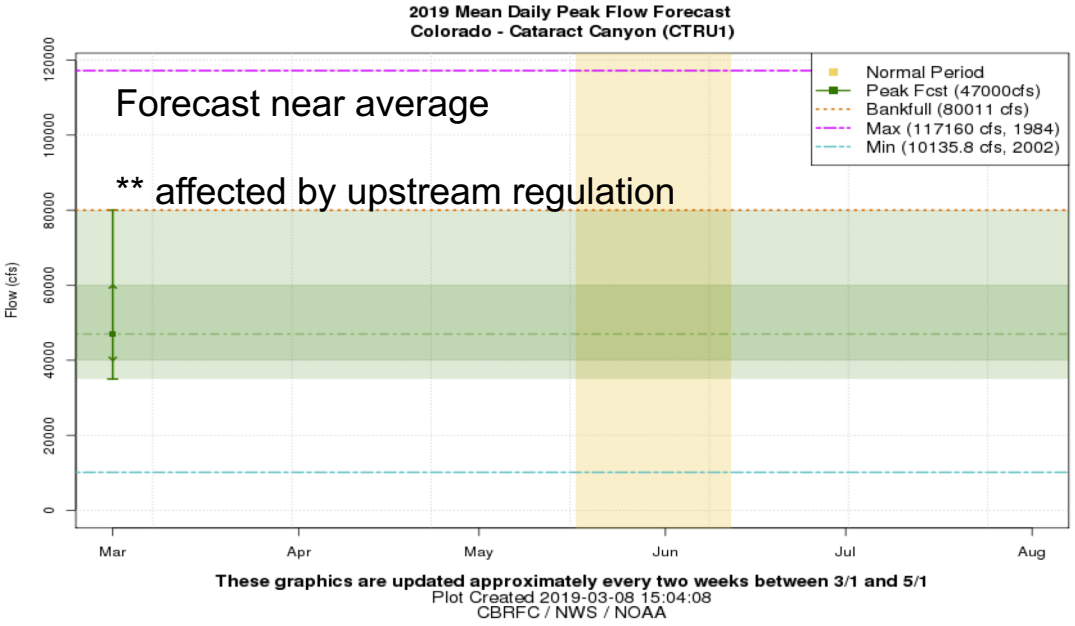
Forecasts are 50% Exceedance

Southeast Utah – Green & Colorado



Green River – Green River UT

Forecast:	**21000 CFS**
Average:	21700 CFS
Flood:	36400 CFS
Last Year:	12700 CFS



Colorado – Cataract Canyon

Forecast:	**47000 CFS**
Average:	48000 CFS
Last Year:	19365 CFS

Forecasts are 50% Exceedance

Peak flow forecasts summary

- Snow melt runoff peak flows are likely to be at or above average for most locations in the Great and Colorado River Basins this spring.
- That means much higher flows compared to last year, and a longer period of higher flows.
- Model guidance has trended up since initial forecasts were issued. Updates early next week will likely show some increases in peak flow forecasts.
- Situation is dynamic and will continue to evolve throughout the spring. Many scenarios are possible.

What can be said about flood potential?

- In those areas with significant snowpack some high water issues are probable, particularly if snowpack continues to increase through April.

- **Above average flows mean reduced channel capacity and greater susceptibility to flood related issues if heavy rain occurs during peak runoff period. The longer the high flows last the longer this period will be.**

- Forecast procedures do not exist for all locations, areas with significant snowpack are increasingly likely to have some high water issues. In many cases these tend to be smaller streams that we do not have in our model.

- In most cases the significance of any snow melt flood threat doesn't identify itself until the late April through mid May period.

Big snow years – best / worst case scenarios

- Worst case scenarios for flood related issues
  - Heavy rain preceded by significant warm period
  - Cool, wet spring and delayed melt into late spring

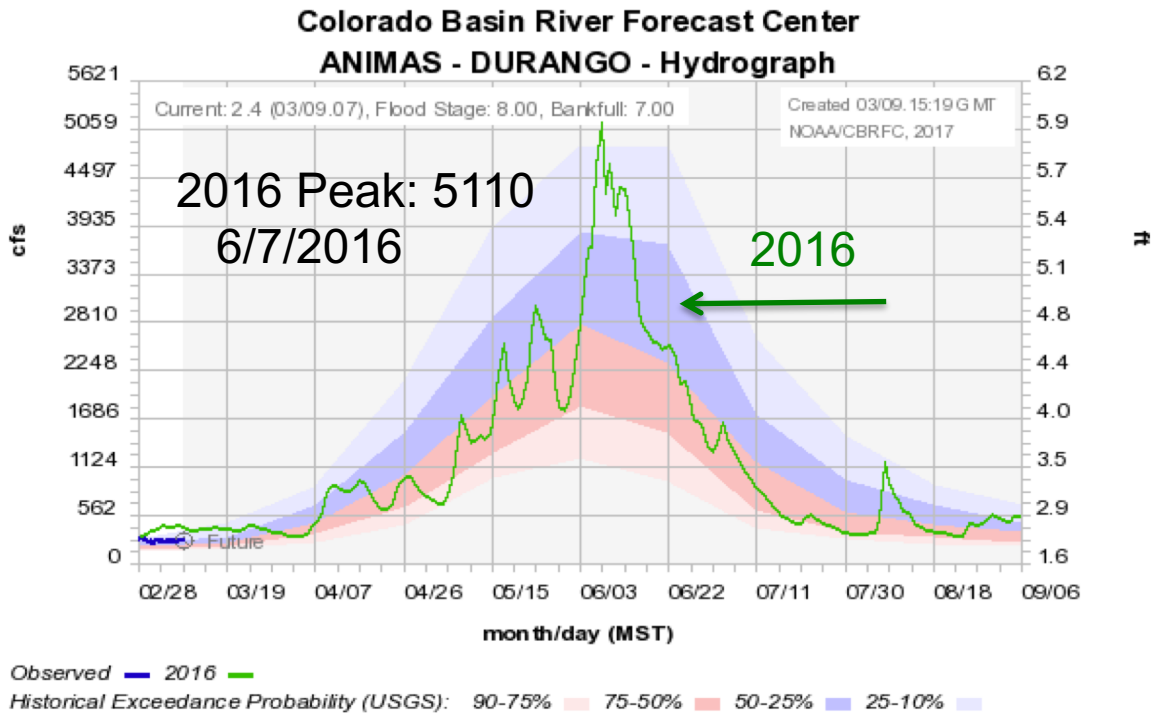
- Best case scenarios to reduce flood related issues:
  - Moderately warm early spring to bring off low/mid snow
  - Lack of heavy rain events during the runoff period

Impacts of Spring Weather (temperatures)

Animas – Durango March 1 2016 Forecast

90%	75%	50%	25%	10%
2800	3100	3600	4300	4700

Normal Peak Period 5/20 – 6/8



Durango Temperatures: 2-6 degrees below normal final 10 days of May

10 degrees above normal by June 5th

Transition to using daily model for guidance

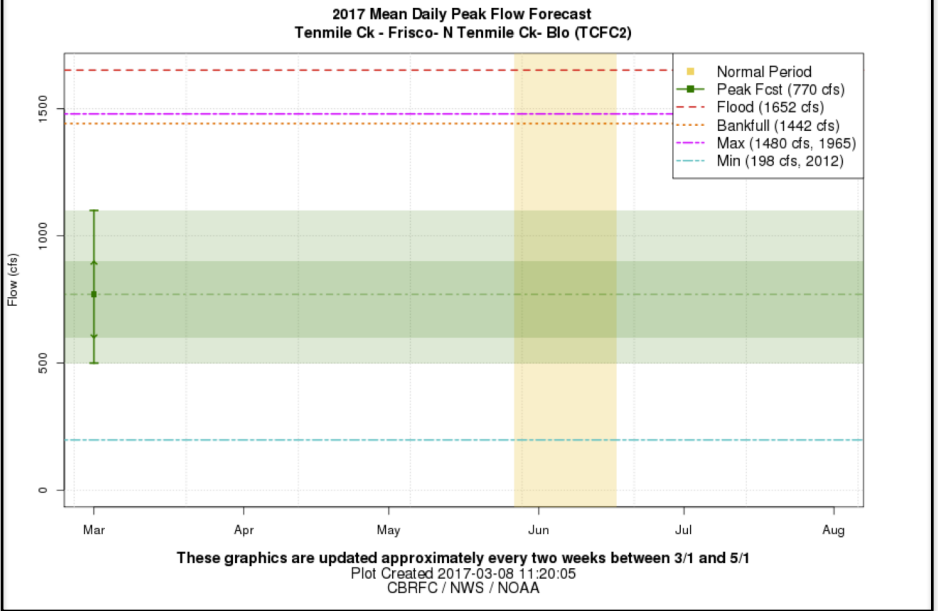
As the time of the peak nears – transition from using probabilistic guidance to output from the daily deterministic hydrologic model. Daily model forecasts are for 10 days into the future.

The daily model uses 5 days of precipitation forecasts and 10 days of temperature forecasts from meteorological models instead of climatology.

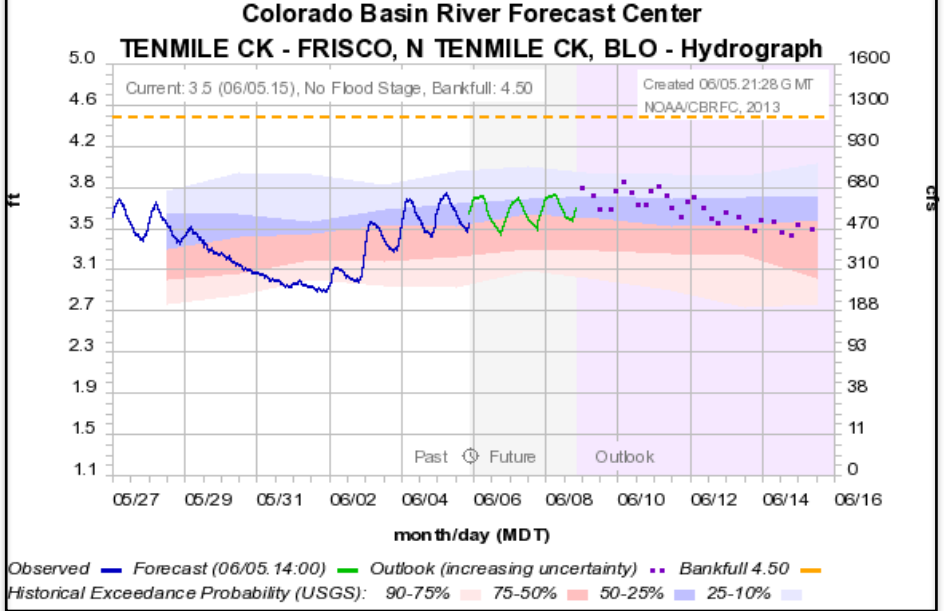
The daily model will also have observed reservoir releases (& planned if known) that are routed to points downstream.

The probabilistic graphics are discontinued at that time (usually early May) and the forecast lists indicates “peaking soon” or “peak has already occurred”.

Probabilistic forecast graphic

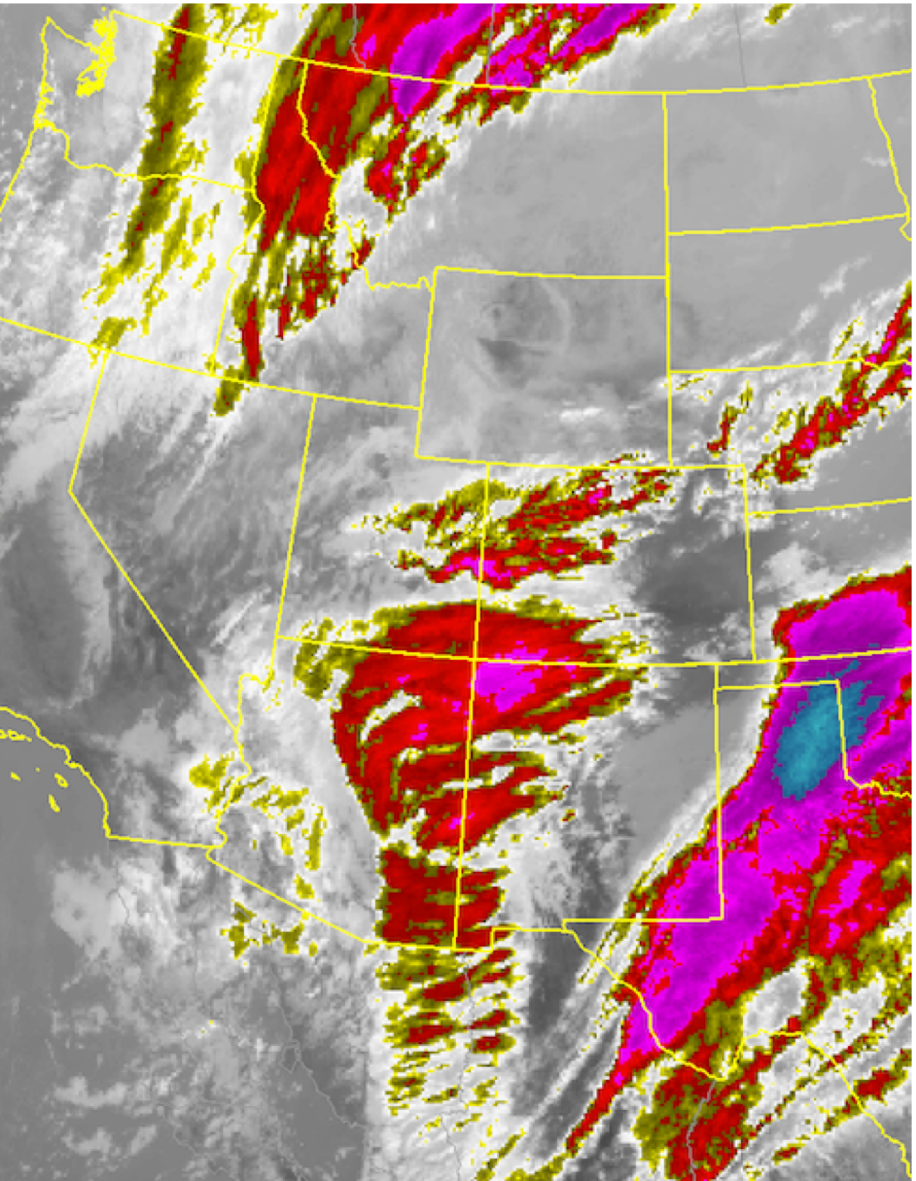


Output from deterministic model

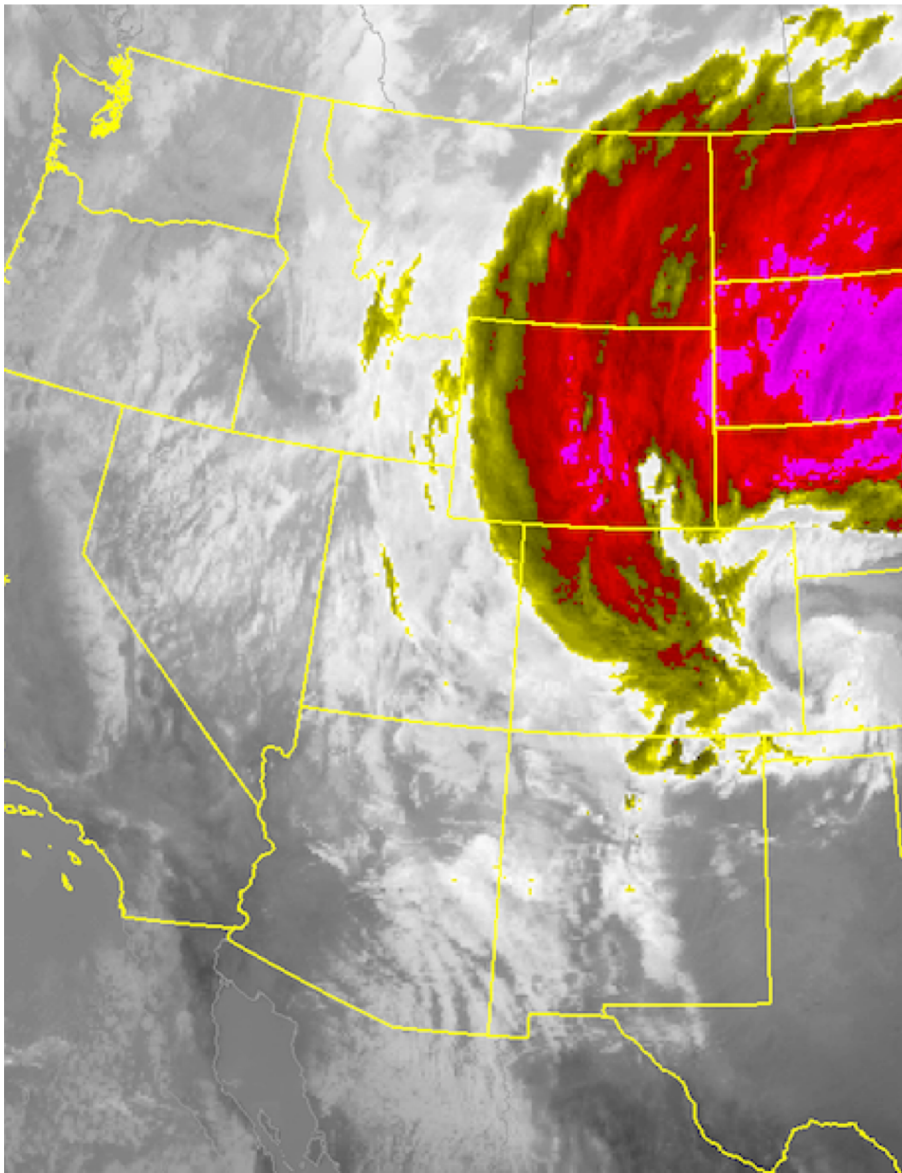


Upcoming Weather – This monster just left, and it brought significant precipitation and snowpack increases to many areas

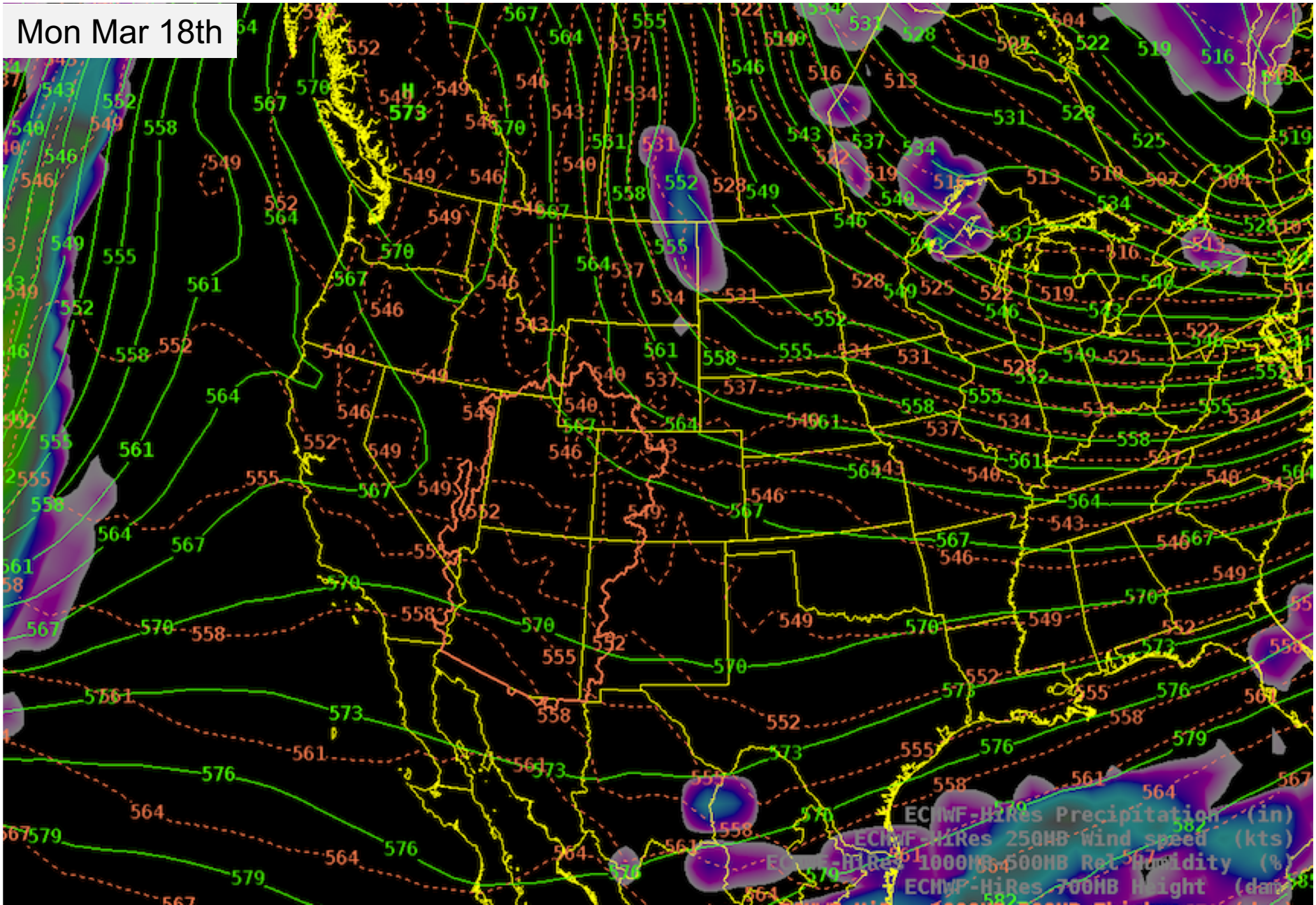
Wed March 13th



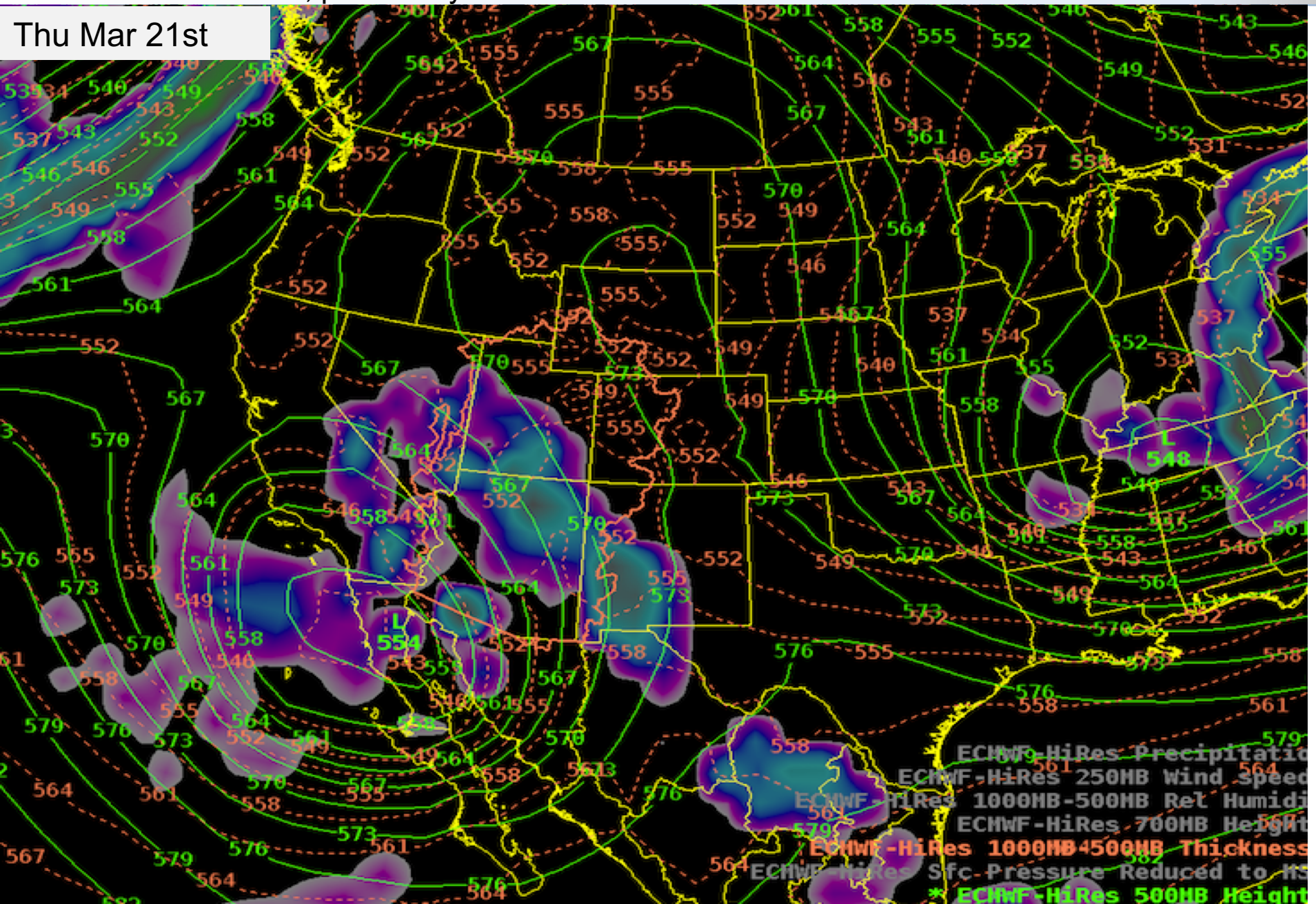
The March 14th



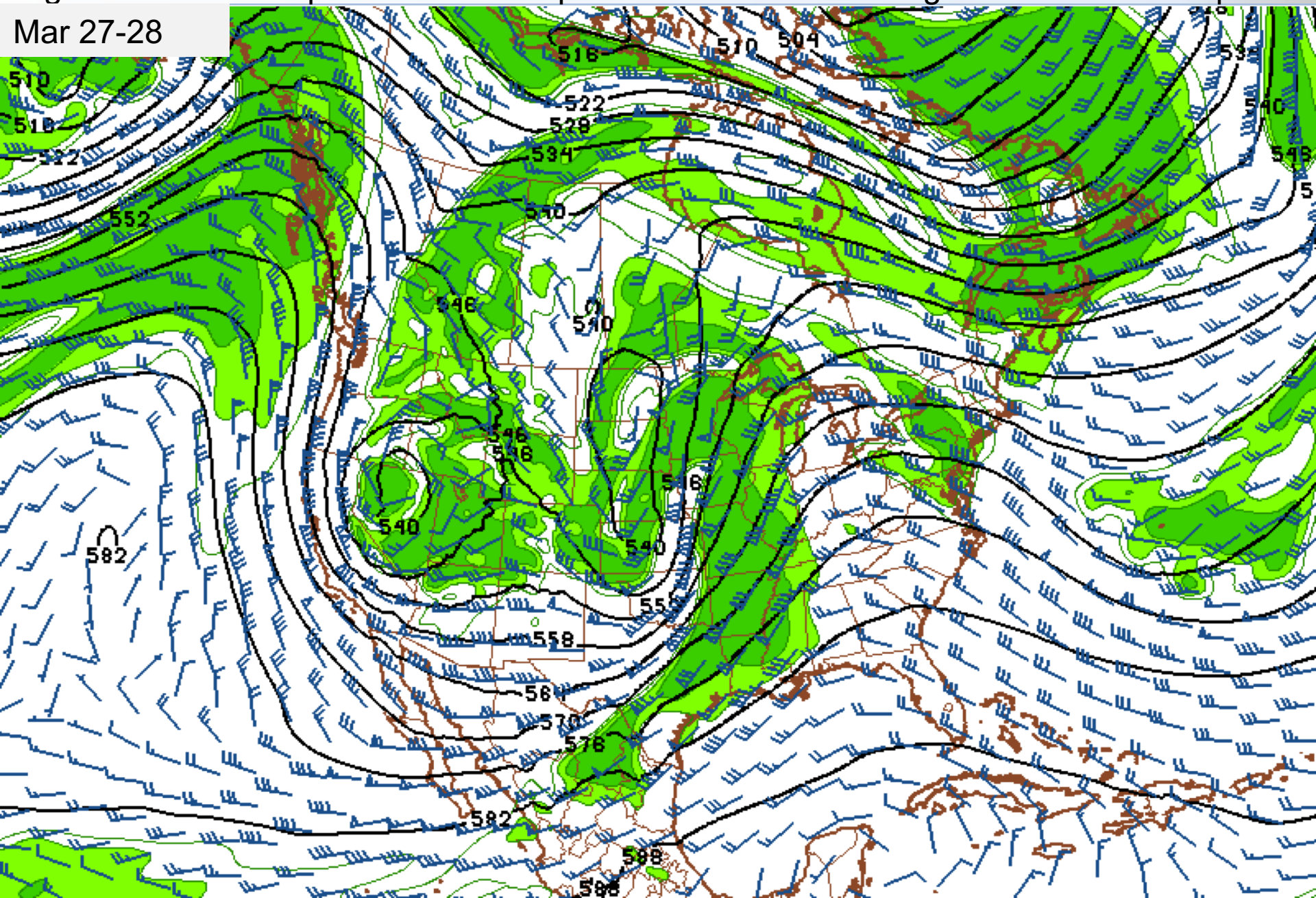
Upcoming Weather – It's going to dry out for a week. High pressure will dominate the weekend into the middle of next week. Some lower elevation snow melt is likely.



Upcoming Weather — Active weather looks poised to return. This model suggests increasing moisture over the area, particularly the southern half of the Great / Colorado River Basins.

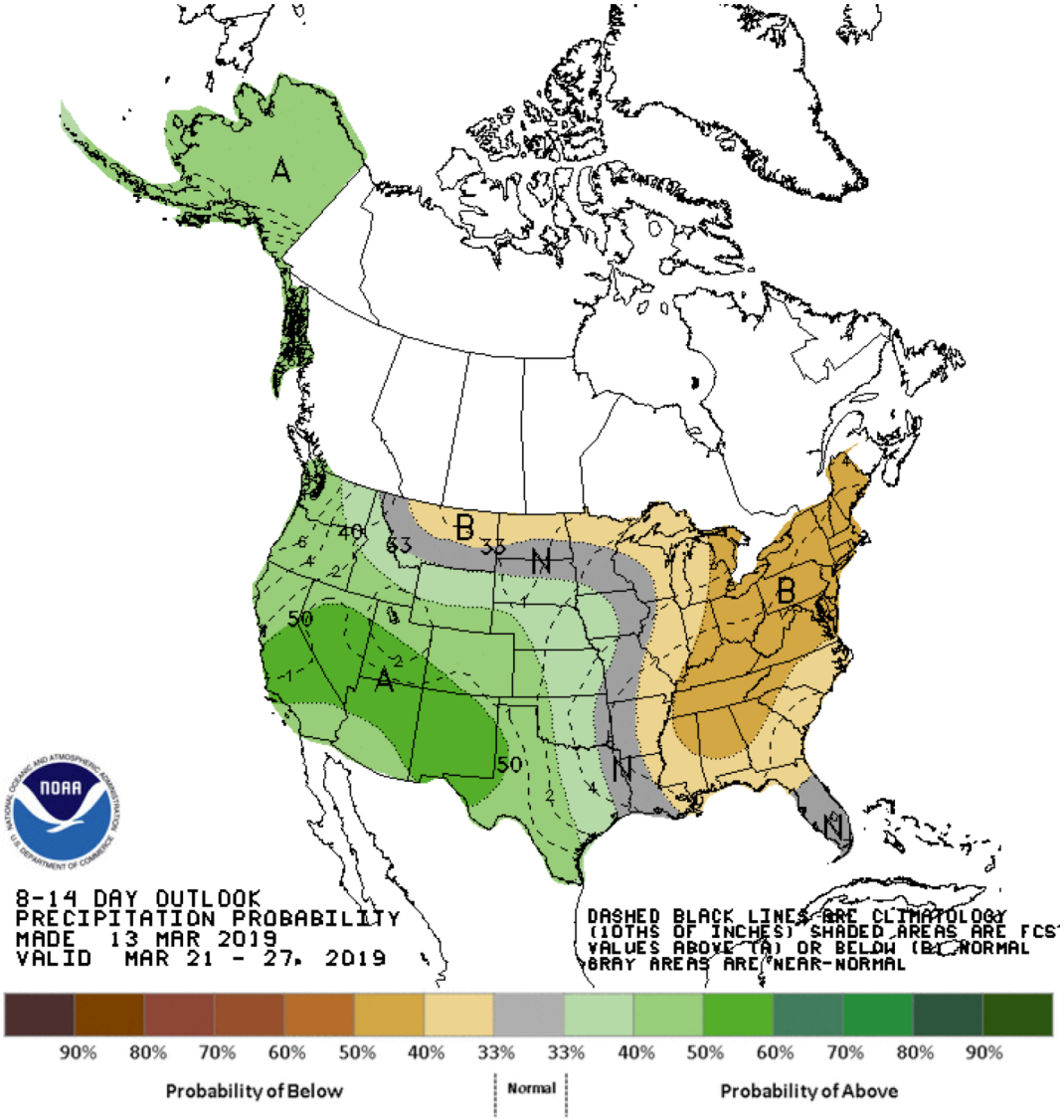


Long Range Weather – Unsettled and wet conditions that would keep middle and high elevation snowpack intact into April – With increases in higher elevation snowpack



Long Range Weather – Precipitation Probability

8-14 day precipitation probabilities
March 21 - March 27 2018



Up Next

- Peak Flow updates twice a month. First update early next week.

- April - Colorado River Basin water supply briefing
  - April 4th at 11 am MDT (www.cbrfc.noaa.gov)

- April - Great Basin water supply briefing
  - April 4th at 1:30 pm MDT (www.cbrfc.noaa.gov)

These slides are available at: www.cbrfc.noaa.gov/present/present2017.cgi

CBRFC Water Supply Contacts

Please contact us with any questions

Michelle Stokes – Hydrologist In Charge
michelle.stokes@noaa.gov

Paul Miller– Service Coordination Hydrologist
Paul.miller@noaa.gov

Basin Focal Points (Forecasters)

Greg Smith – San Juan, Gunnison, Dolores Focal Point
greg.smith@noaa.gov

Ashley Nielson – Green River Basin, Lake Powell Focal point
ashley.nielson@noaa.gov

Cody Moser – Upper Colorado Mainstem Focal point
Cody.moser@noaa.gov

Tracy Cox and Zach Finch – Lower Colorado Basin, Virgin Focal Point
tracy.cox@noaa.gov
zach.finch@noaa.gov

Brent Bernard – Six Creeks, Provo, Sevier Focal Point
brent.bernard@noaa.gov

Patrick Kormos– Bear, Weber Focal Point
brent.bernard@noaa.gov