Peak Flow Forecast Briefing

March 18th, 2021

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Colorado Basin River Forecast Center
National Weather Service
NOAA

Webinar recording & slides will be available on CBRFC webpage

Today's Presentation

- Peak flow forecast products overview
  - Mean daily peaks
  - Instantaneous peaks
  - Peak percentiles
- How to find and interpret peak flow information
  - Peak flow maps
  - Peak flow list
  - Peak flow graphics
  - Peak Flow Dashboard
- Current conditions driving peak flow forecasts
- Specific peak flow forecast graphics
- Spring weather impacts
- Upcoming weather
- Summary of flood concerns

Participants will be muted during the webinar.

If you have a question please type it in or raise your hand and questions will be answered at the end of the webinar.

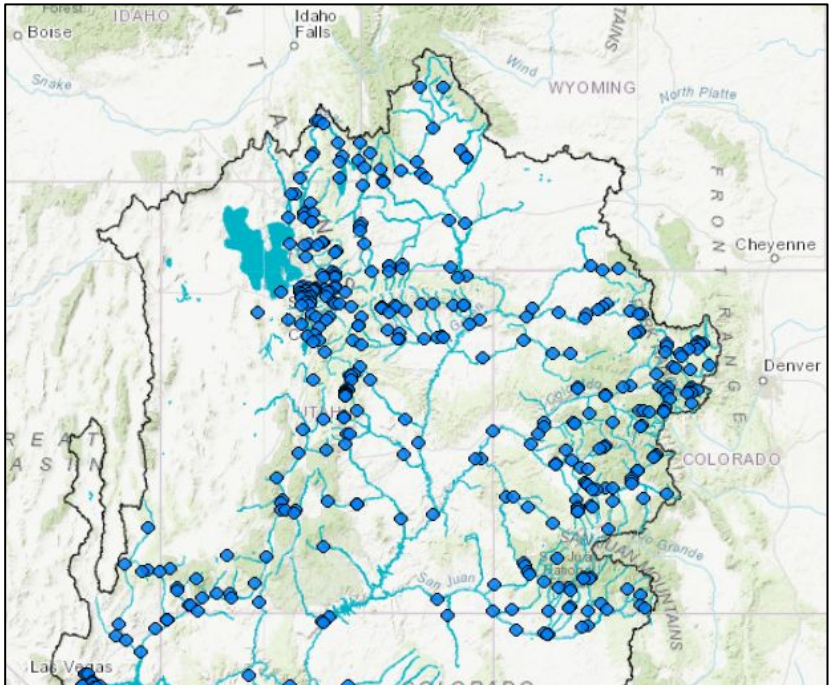
Webinar recording & slides will be available on the CBRFC webpage.

Official Mean Daily Peak Flow Forecast Overview

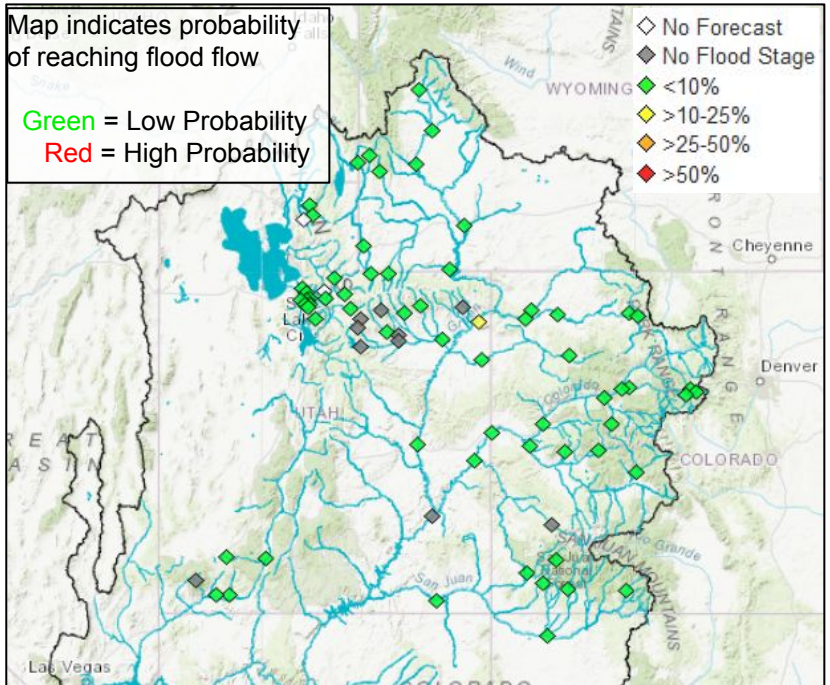
- Official mean daily peak flow forecast points are a subset of our daily river forecast points
- Many of these legacy peak flow forecast points were originally developed with recreation interests in mind
- Most of these sites have established flood stages and therefore provide some flood threat information
- Updated bi-weekly by forecasters March - May 1

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

Daily River Forecast Points



Official Mean Daily Peak Flow Forecast Points

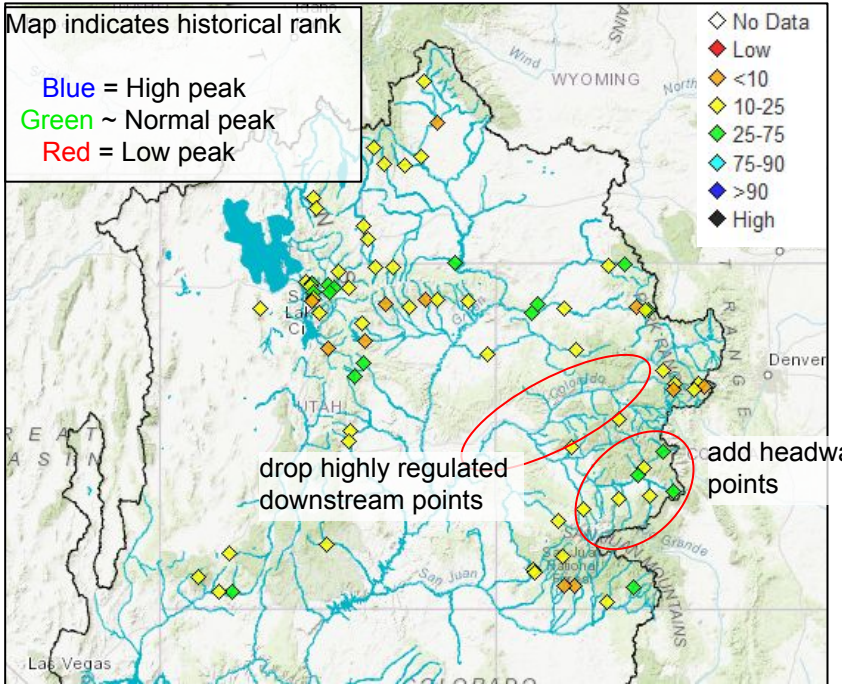


Peak Flow Percentiles Overview

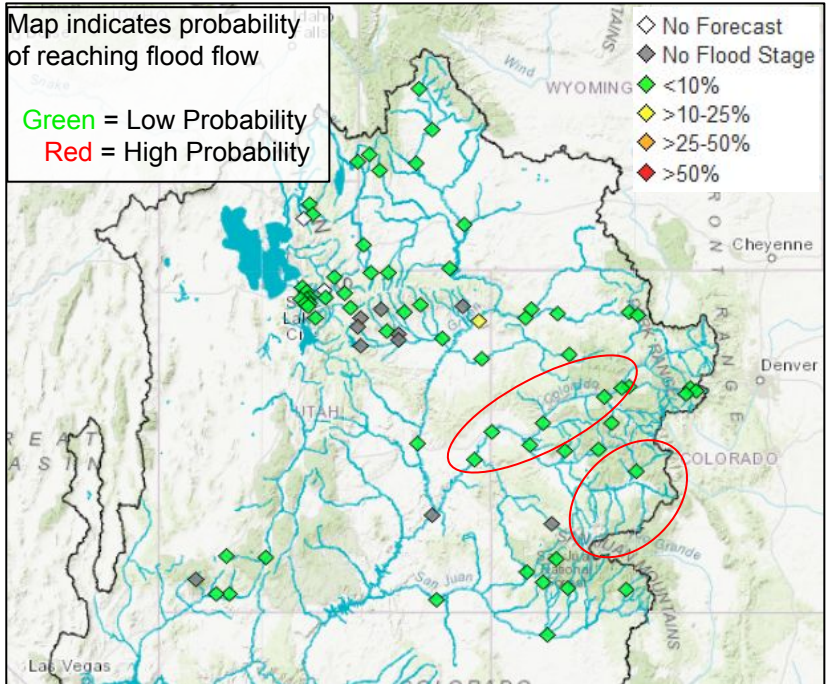
- Peak flow percentile points are a different set of sites than legacy peak flow forecast points (some overlap)
- These points generally have **limited regulation** and a long period of record, but not necessarily an established flood stage
- This map provides context to the historical record, rather than flood probability
- Updated daily from raw hydrologic model guidance

Daily deterministic forecasts are the best source of information as the peak nears

Model Guidance Peak Flow Percentile Points



Official Mean Daily Peak Flow Forecast Points

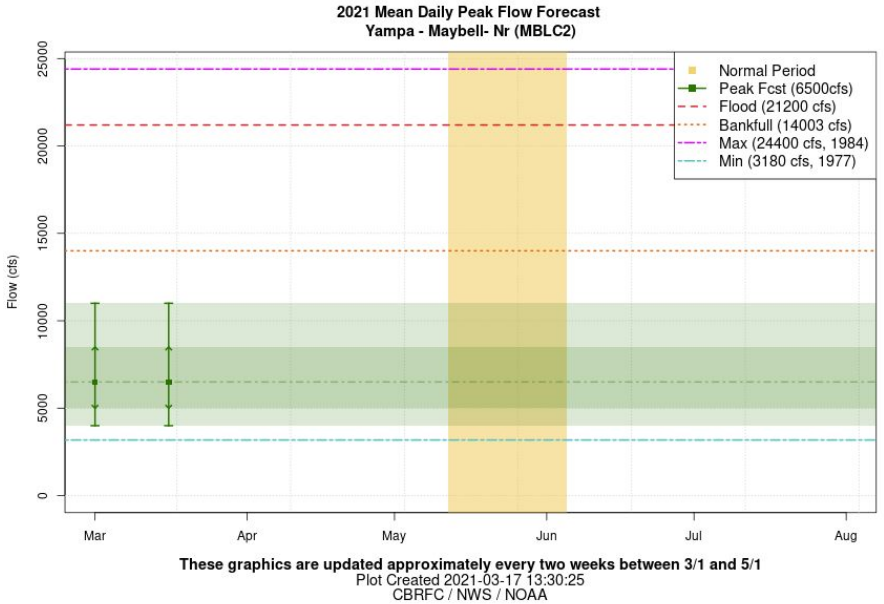


Official Mean Daily Snowmelt Peak Flow Forecast

- Probabilistic (regulated ESP) forecaster reviewed
  - Long range outlook of peak magnitude
  - Likelihood of exceeding flood thresholds
  - Accounts for reservoirs/diversions
    - based on historical operations
  - Updated bi-weekly March - May 1
    - updates end earlier if peak is near or has occurred

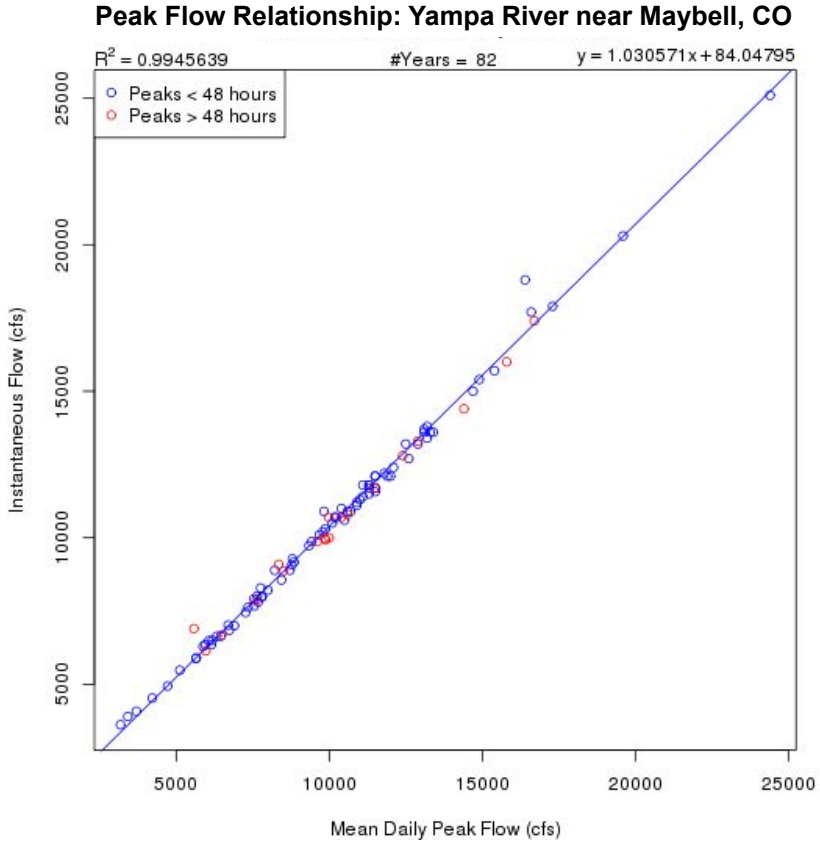
- Do not provide specific date of peak
  - *Typically only have a 5-10 day forecast lead time for timing the peak*

- Limitations:
  - Peak timing
  - Infrequent updates
  - Lack of late season guidance
  - Only for locations with defined thresholds
  - Lack of historical context



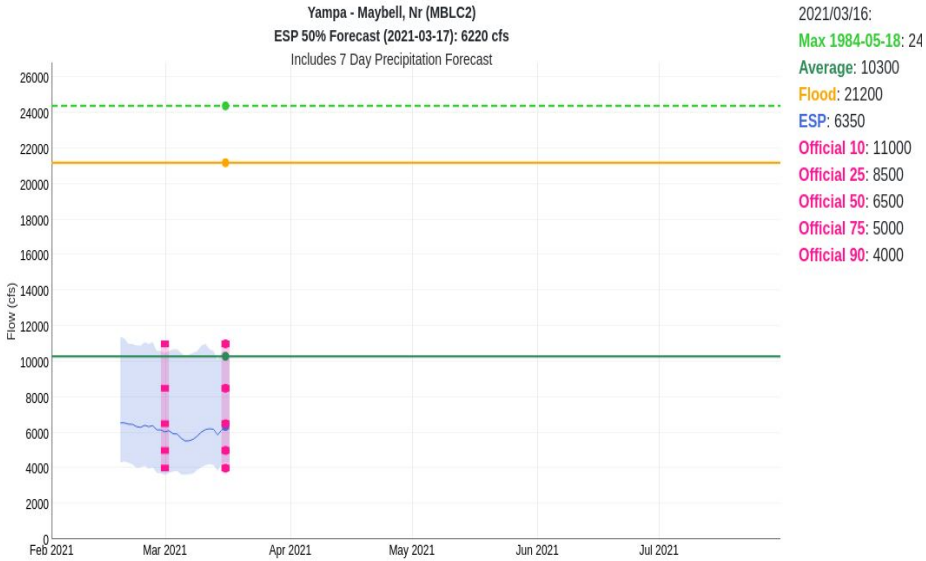
Instantaneous Peak Flow Forecasts

- Relationship between mean daily peak and instantaneous peak in each year
- Only available for locations with strong correlations and long historical record
- Sites with frequent heavy rain have poor relationships



Mean Daily Peak Flow Percentiles Forecast

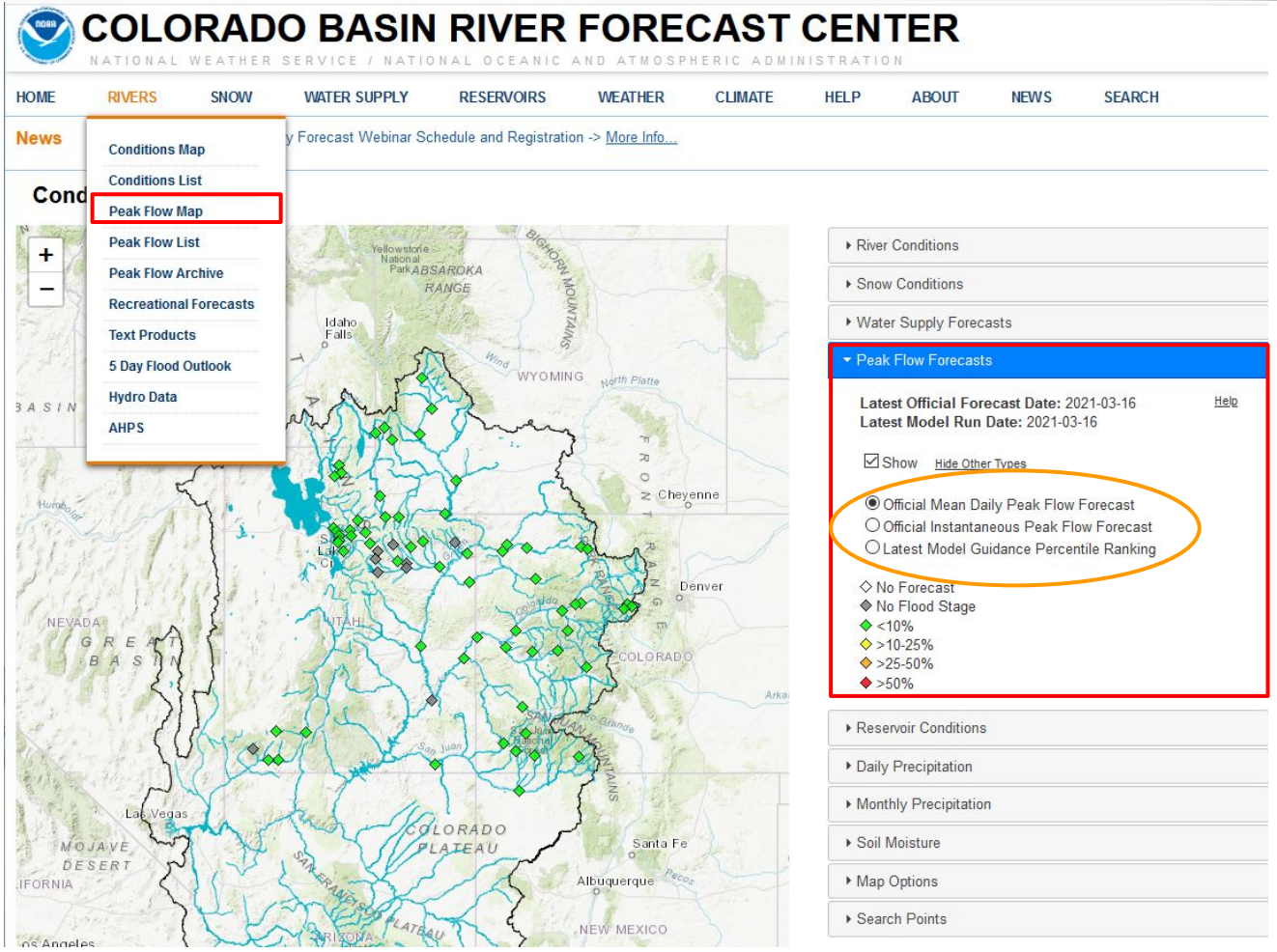
- Probabilistic (regulated ESP) raw model guidance
  - Ranks the forecast 50% exceedance mean daily peak within the historical record of yearly snowmelt runoff peaks for that site
  - Updated daily
  - Limited regulation - generally headwater sites
- Probabilistic information for time of peak is also available
  - *This will usually point to the 'normal time of peak' until 5-10 days to peak - then it is best to watch the daily deterministic forecasts*
- Available throughout spring snowmelt period
  - Legacy peak flow forecasts stop May 1 (if not before)
  - Helpful for tracking flood/high water potential in late melts and for flows after the seasonal peak



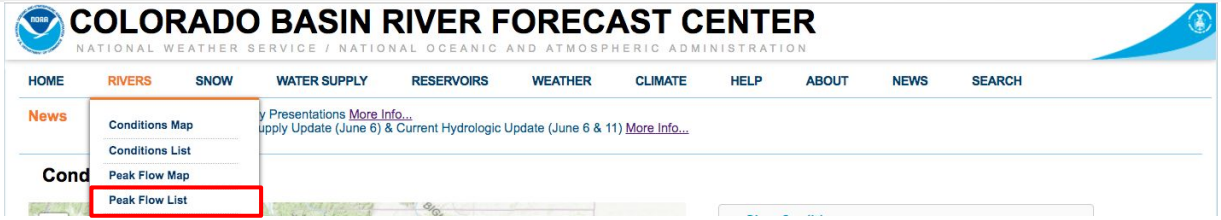
Where to Find Peak Flow Information

https://www.cbrfc.noaa.gov/

1. Hovering over a point on the map will give the location name
2. Clicking on a point will show a pop-up graph
3. Clicking on the pop-up will open a new page with the graph and more options



Peak Flow List Overview



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

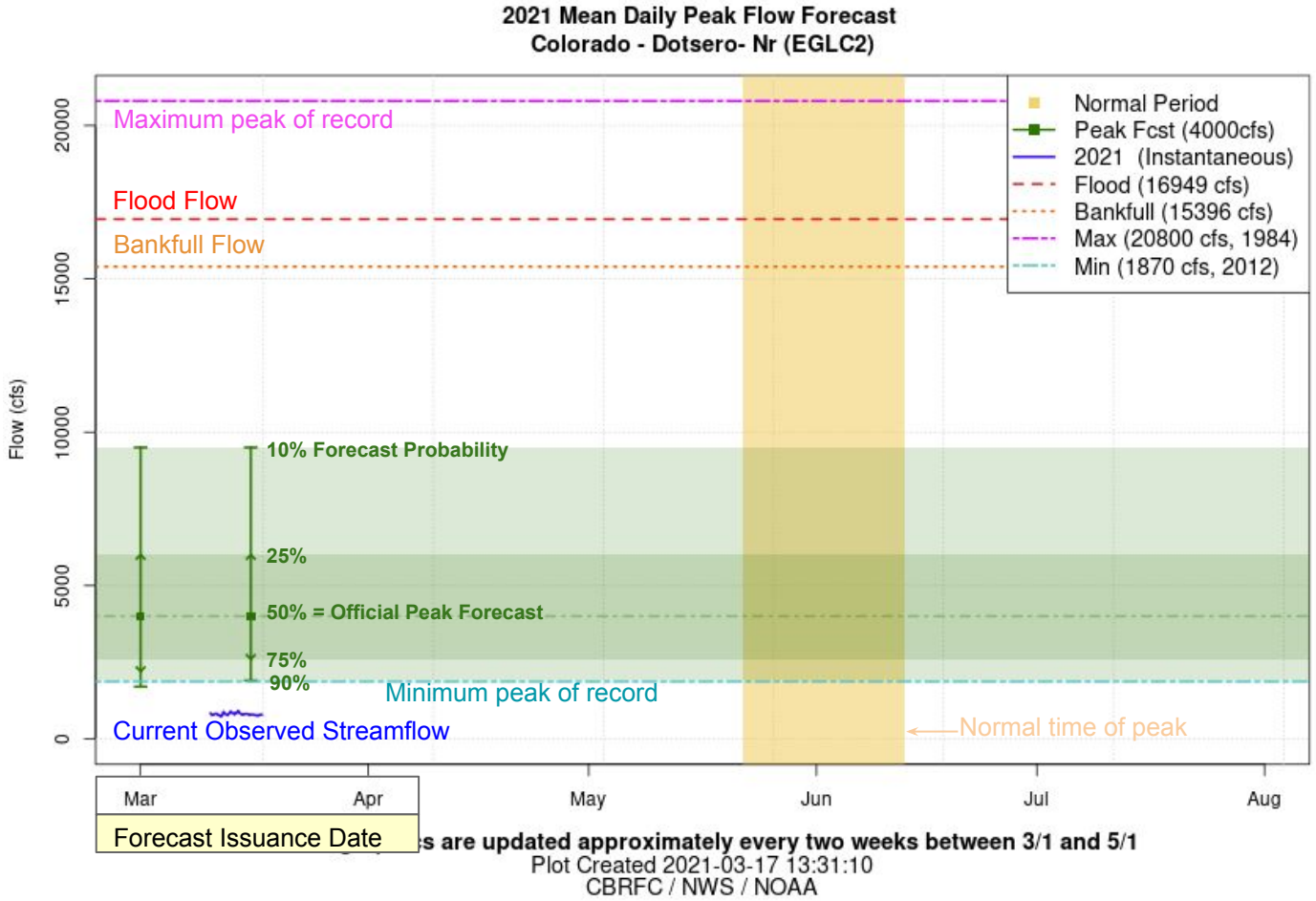
Columns (on/off): ID | River | Location | Flood Flow | PI | Issue Date | Observed Peak to Date | Observed Date | Historic Peak | Hist Peak Date | Average Peak | Normal Earliest Date | Normal Latest Date | Last Year Peak | Last Year Date | Notes | Area | Sub Area | DS

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	Notes
1	ENMC2	Elk	Milner	5920	◇	2020-03-19	2900	3400	3800	4800	6000	3300	3800	4300	5400	6800	7000	3865	05-17	06-03	6410	2019-06-22	
2	YDLC2	Yampa	Deerlodge Park	20750	◇	2020-03-19	10300	12000	13500	16000	21000	11000	12000	14000	17000	22000	32300	13470	05-11	06-04	15800	2019-06-24	
3	TADU1	Duchesne	Tabiona	1810	◆	2020-03-19	130	200	350	750	950	220	290	450	890	1100	2810	925	05-14	06-12	1730	2019-06-15	Peak Flow Forecasts Are Regulated Forecasts Based On Upstream Diversions And Regulation
4	YLLU1	Yellowstone	Altonah	2080	◆	2020-03-19	460	600	700	950	1100	560	740	880	1200	1400	1980	950	05-22	06-16	1480	2019-06-15	
5	NEUU1	Uinta	Neola	3540	◆	2020-03-19	480	600	750	1100	1300	NA	NA	NA	NA	NA	3000	1245	05-15	06-11	1910	2019-06-15	
6	DURU1	Duchesne	Randlett	6220	◆	2020-03-19	350	450	1000	2100	3500	770	870	1400	2500	3900	8450	3070	04-29	06-28	6850	2019-06-18	Peak Flow Forecasts Are Regulated Forecasts Based On Upstream Diversions And Regulation
7	JESU1	Green	Jensen	24100	◆	2020-03-19	13500	15500	17000	20000	23000	14000	16000	18000	21000	24000	38500	16990	05-11	06-07	20800	2019-06-12	Peak Flow Forecasts On The Green River Below Flaming Gorge Reservoir Are Based On Usbr Planned Regul
8	GRVU1	Green	Green River	36400	◆	2020-03-19	14500	16500	19000	24000	29000	15000	17000	19000	24000	30000	47200	21700	05-16	06-11	28600	2019-06-20	Peak Flow Forecasts On The Green River Below Flaming Gorge Reservoir Are Based On Usbr Planned Regul
9	WBRW4	Green	Daniel	8620	◆	2020-03-19	1600	1800	2200	2500	2900	1600	1800	2300	2600	3000	5620	2695	05-27	06-28	2930	2019-06-10	
10	BPNW4	New Fork	Big Piney	8850	◆	2020-03-19	2200	2500	3100	3800	4600	2300	2600	3200	3900	4700	9110	4730	05-26	06-23	6660	2019-06-10	

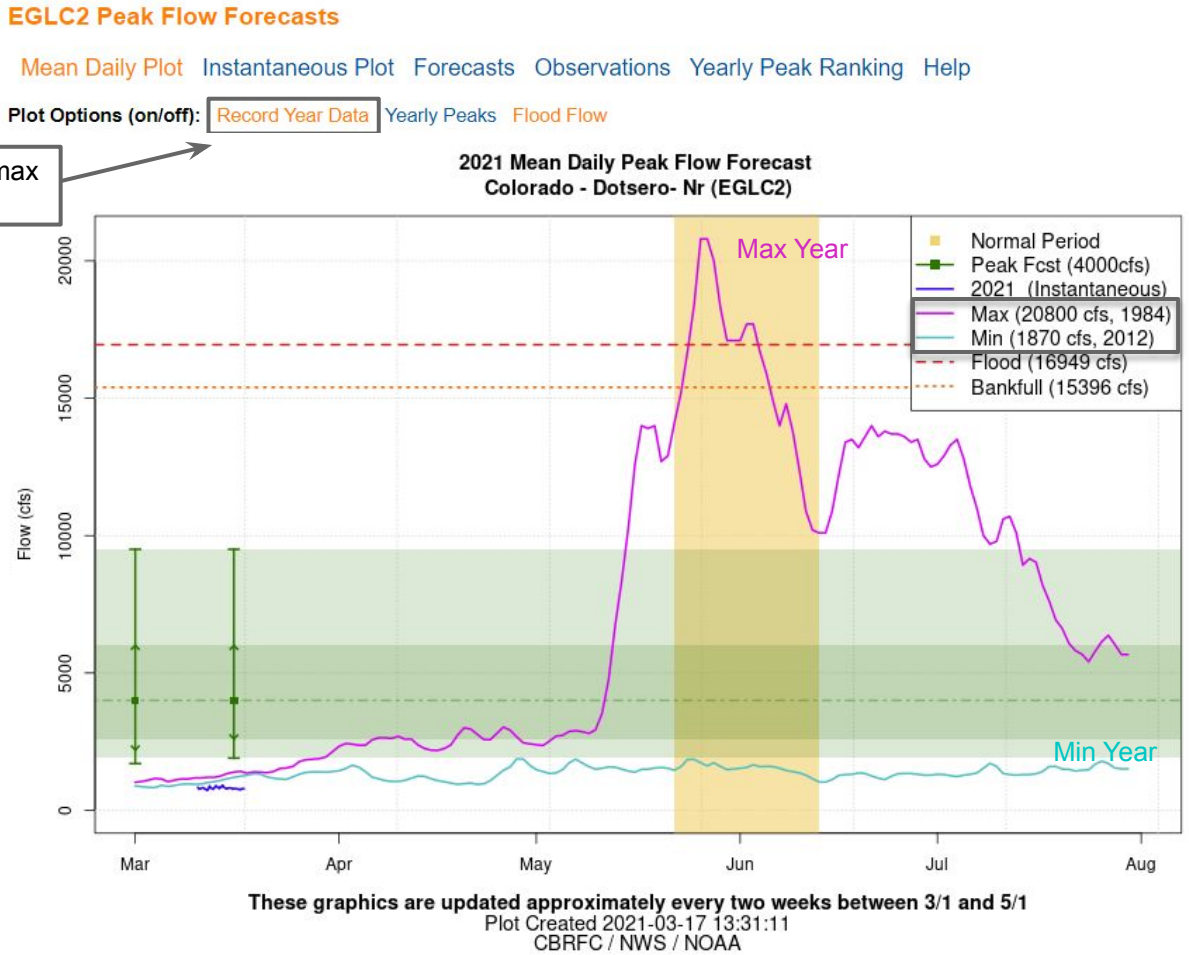
Click on site id to open new page with graphic and additional information

Peak Flow Graphic Overview



Peak Flow Graphic Overview

Select to plot min and max year hydrographs



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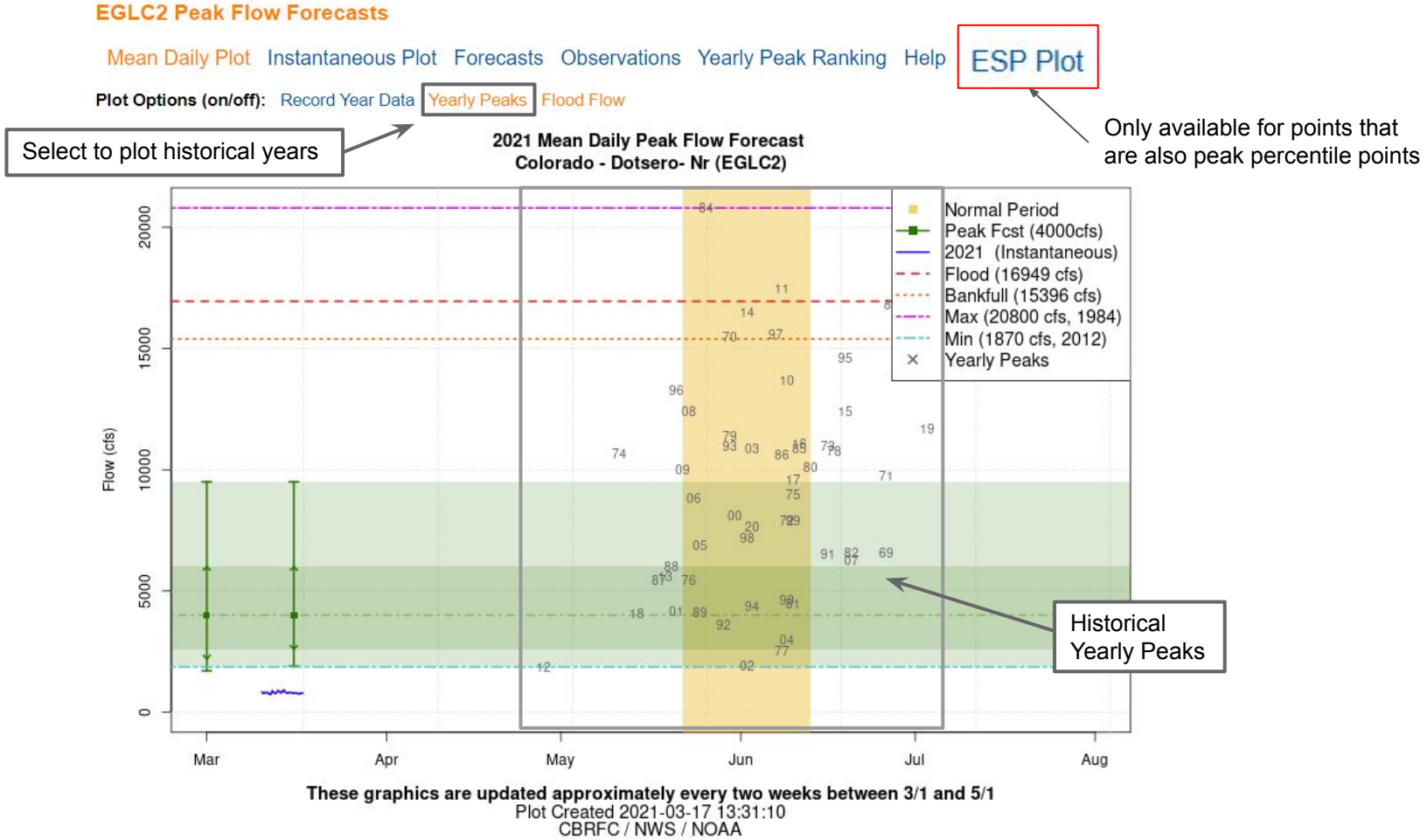
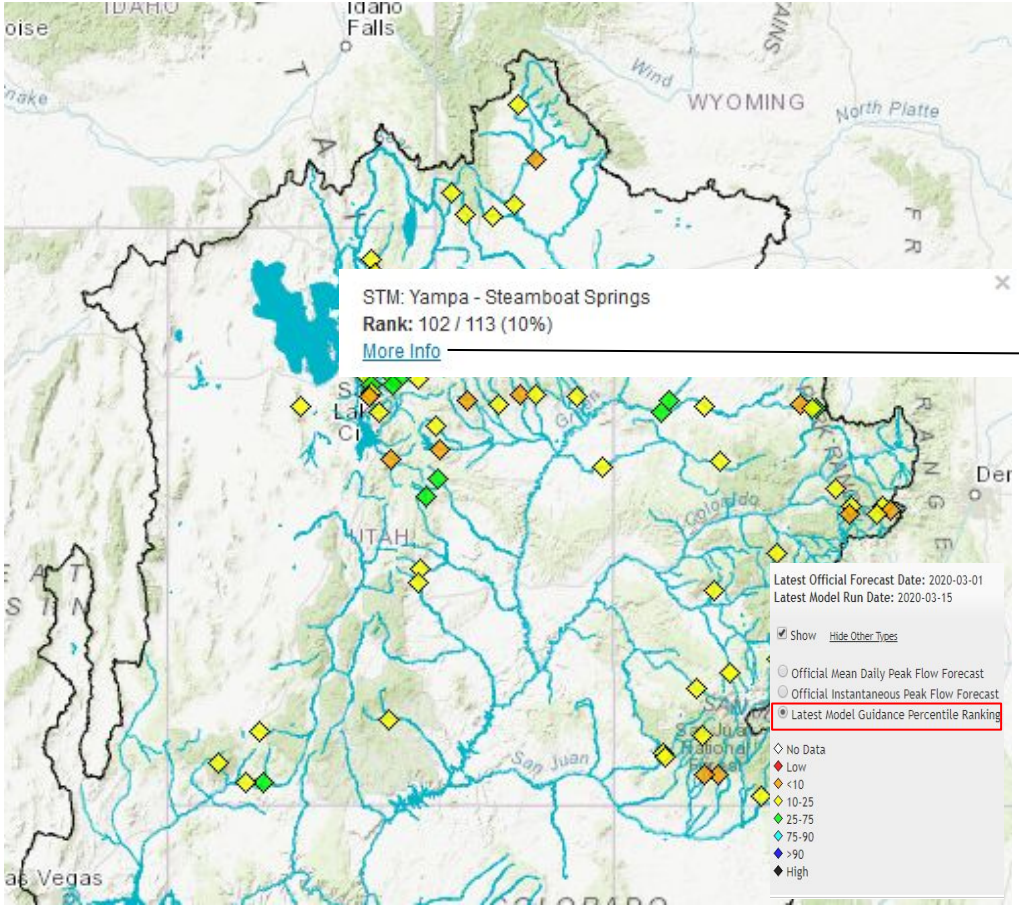


Peak Flow Dashboard



Colorado Basin River Forecast Center
National Oceanic and Atmospheric Administration

Search

Peak Flood Potential - STMC2 - Rank: 102 / 113 (10%)

ESP Peak Flow Evolution Plot

ESP Peak Flow Forecast Table

STMC2
ESP Mean Daily Peak Includes 7 Day Precipitation Forecast
Forecast Date: 2021-03-17
Flood Flow: 5930 CFS

Exceedance Probability	Mean Flow CFS
min	1070
90%	1310
75%	1510
50%	2010
25%	2640
10%	3440
max	3860

STMC2
ESP Date of Peak Includes 7 Day Precipitation Forecast
Forecast Date: 2021-03-17
Normal Time of Peak: 05/19 - 06/10

Exceedance Probability	Date of Peak
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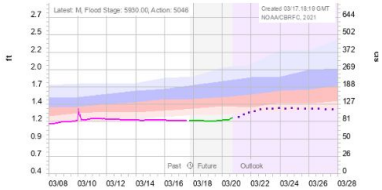
90%	2021-05-23
75%	2021-05-29
50%	2021-06-05
25%	2021-06-09
10%	2021-06-18
max	2021-06-22

10 Day Streamflow Forecast

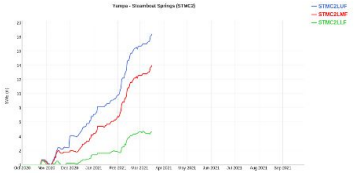


10 day Streamflow Forecast Table

YAMPA - STEAMBOAT SPRINGS
Daily Average Forecast Flow (ending at given date/time)
Units: CFSD
csv file

DATE	TIME	FLOW
3/18/2021	12Z	82
3/19/2021	12Z	81
3/20/2021	12Z	83
3/21/2021	12Z	92
3/22/2021	12Z	104
3/23/2021	12Z	112
3/24/2021	12Z	115
3/25/2021	12Z	114
3/26/2021	12Z	113
3/27/2021	12Z	113

Model Snow



Apr-Jul Historical Peaks

STMC2 QRD5ZZZ Apr-Jul Historical Peaks
High -> Low (reverse table order)
csv file

RANK	YEAR	PEAK	DATE
1	1921	5870.0	6/15
2	1984	5550.0	5/26
3	1917	5280.0	6/20
4	1952	5190.0	6/5
5	1914	5120.0	6/4
6	1957	5100.0	6/8
7	1997	5090.0	6/4
8	1983	5040.0	6/26
9	2011	4970.0	6/8
10	1928	4920.0	5/31

Peak Flow Dashboard

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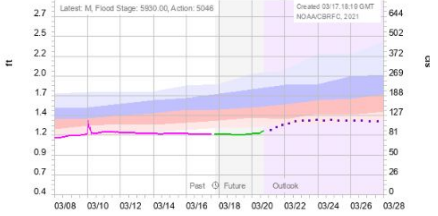
10%	2021-06-18
max	2021-06-22

Long Range Probabilistic Peak Flow Guidance: Planning Tool

10 Day Streamflow Forecast



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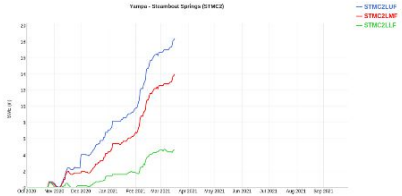
3/23/2021	12Z	112
3/24/2021	12Z	115
3/25/2021	12Z	114
3/26/2021	12Z	113
3/27/2021	12Z	113

Daily Deterministic Streamflow Forecast: Use as the time of peak nears

Model Snow



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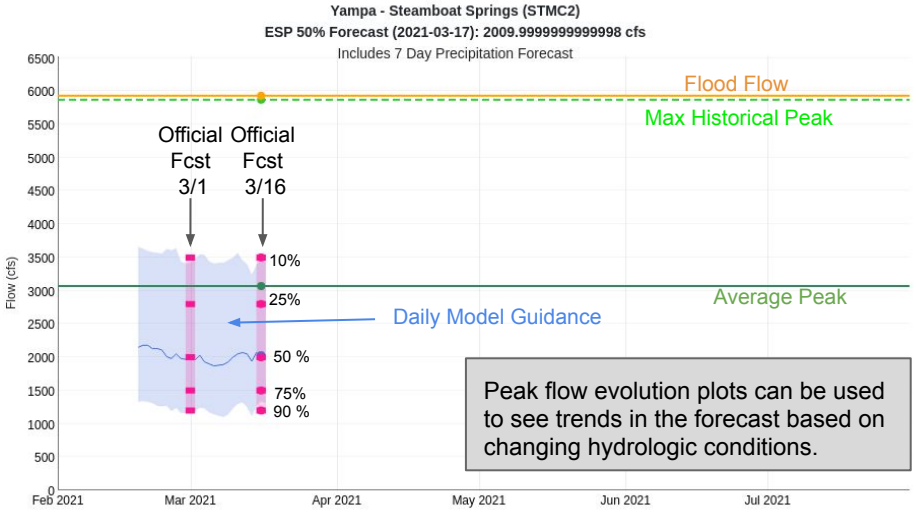
6	1957	5100.0	6/8
7	1997	5090.0	6/4
8	1983	5040.0	6/26
9	2011	4970.0	6/8
10	1928	4920.0	5/31

Supplemental Information



2021/03/16:
Max 1921-06-15: 5
Average: 3070
Flood: 5930
ESP: 2030
Official 10: 3500
Official 25: 2800
Official 50: 2000
Official 75: 1500
Official 90: 1200

Peak flow evolution plots can be used to see trends in the forecast based on changing hydrologic conditions.

ESP Peak Flow Forecast Table

STMC2 ESP Mean Daily Peak Includes 7 Day Precipitation Forecast Forecast Date: 2021-03-17 Flood Flow: 5930 CFS	
Exceedance Probability	Mean Flow CFS
min	1070
90%	1310
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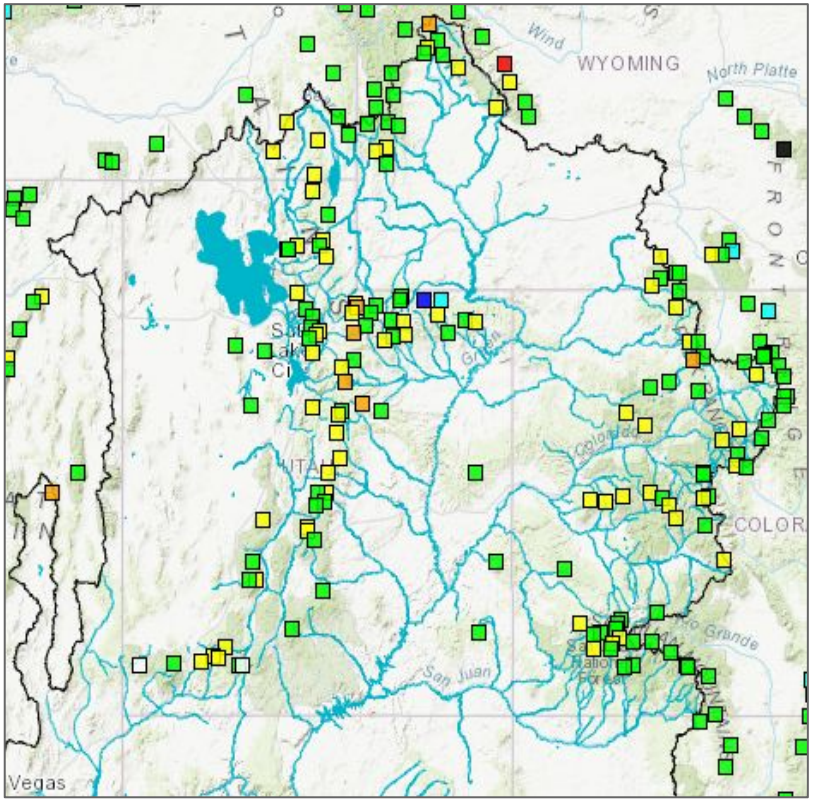
75%	2021-05-29
50%	2021-06-05
25%	2021-06-09
10%	2021-06-18
max	2021-06-22

ESP Tables includes:

- Probability of peak magnitude
- Probability of peak date
  - Likelihood for date of peak whatever the magnitude
  - → 90% magnitude not forecast to occur at 90% date of peak

Snow Conditions Impacting Peak Flows

SNOTEL (Observed)
Ranking as of March 17 2021

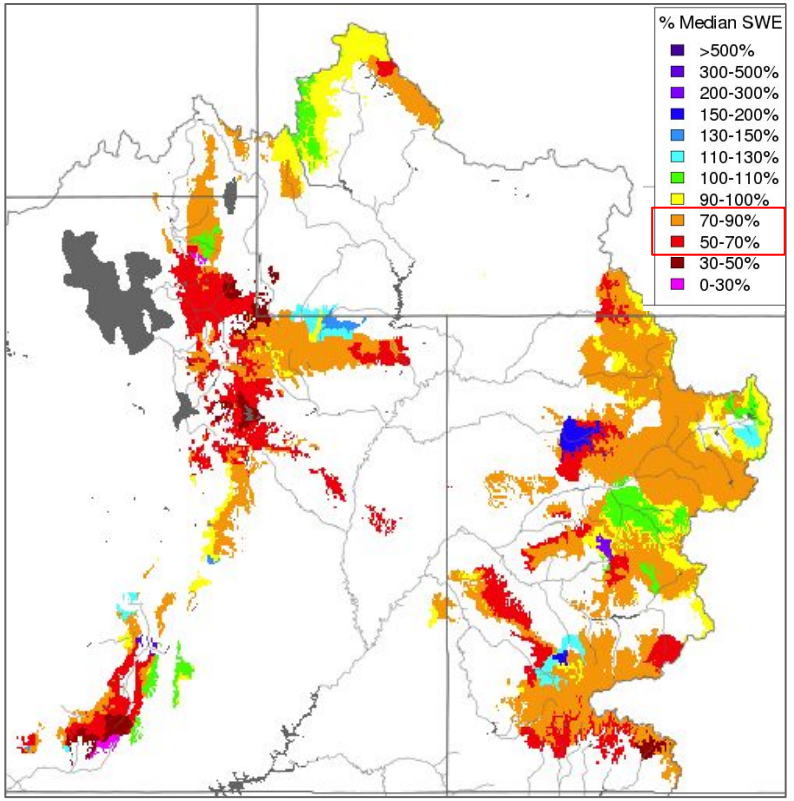


Period of Record
33-43 years

- Percentiles
- Percent Average
- Percent Median

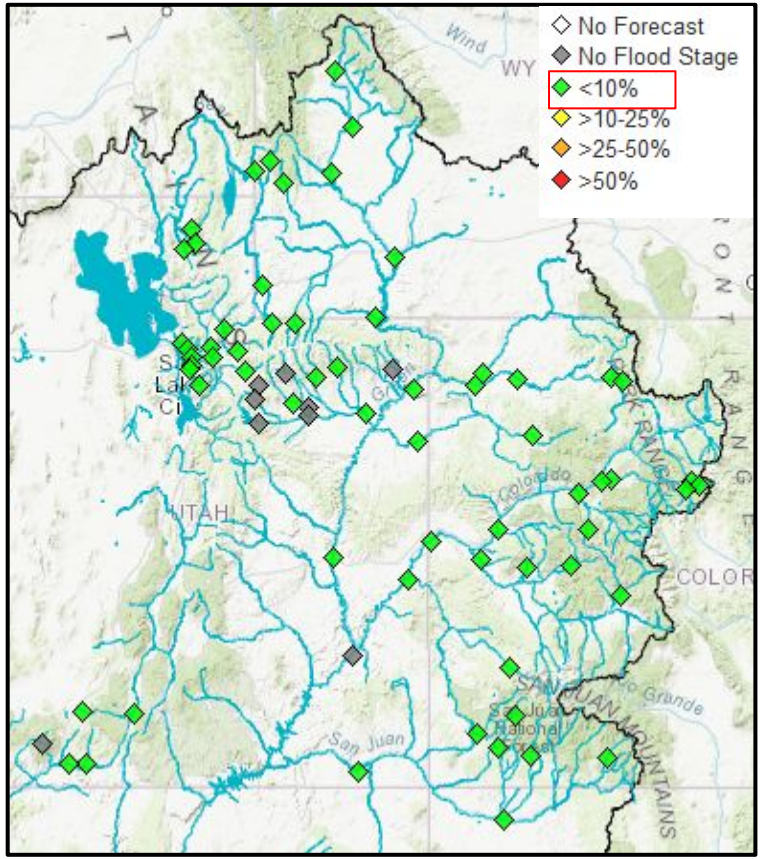
- No Data
- Low
- <10
- 10-25
- 25-75
- 75-90
- >90
- High

CBRFC Model
March 17 2021



Mid-March 2021: Mean Daily Peak Forecasts

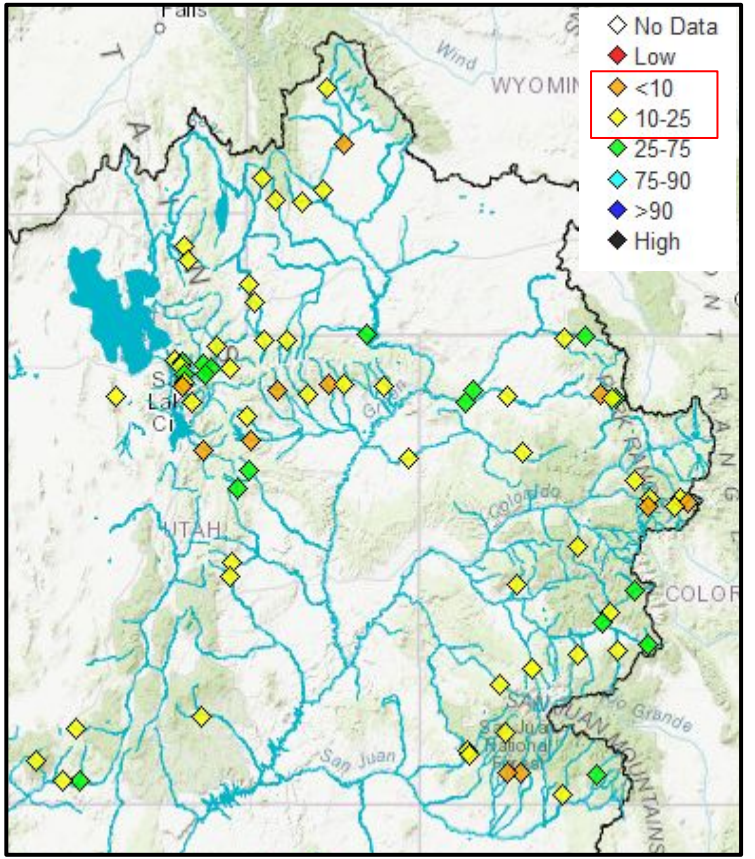
Official Mean Daily Peak Flow Forecast



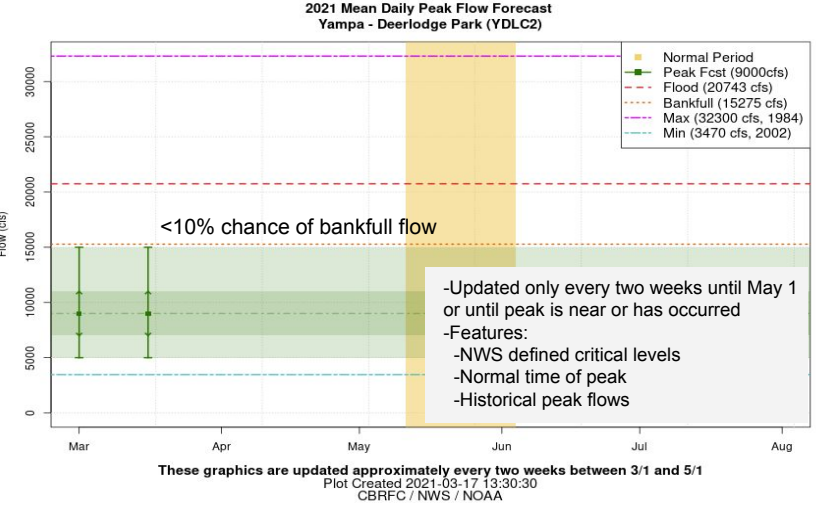
<10% chance of reaching flood stage at mean daily peak flow forecast points

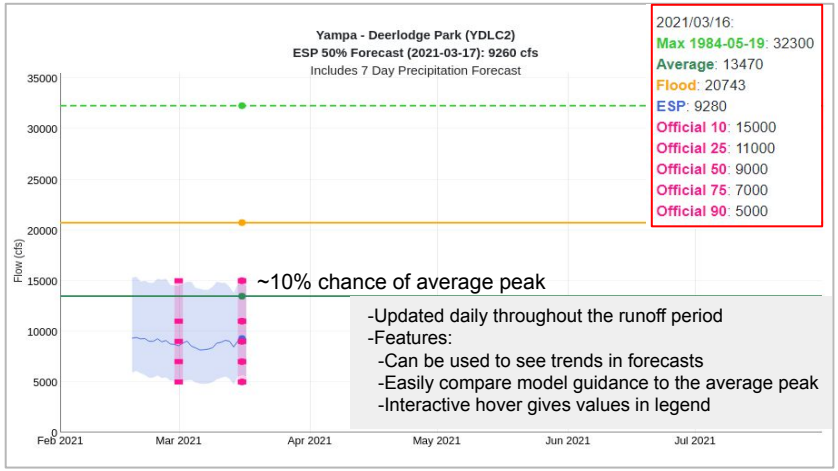
Majority of sites on percentile ranking map indicate expected peaks will be in the bottom 25th percentile of the historical record

Latest Model Guidance Percentile Ranking



Peak Flow Forecasts: Yampa River Basin

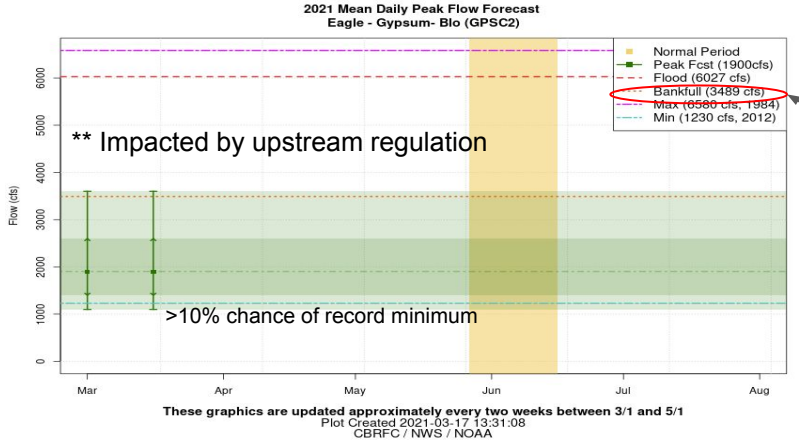




Yampa River-Deerlodge

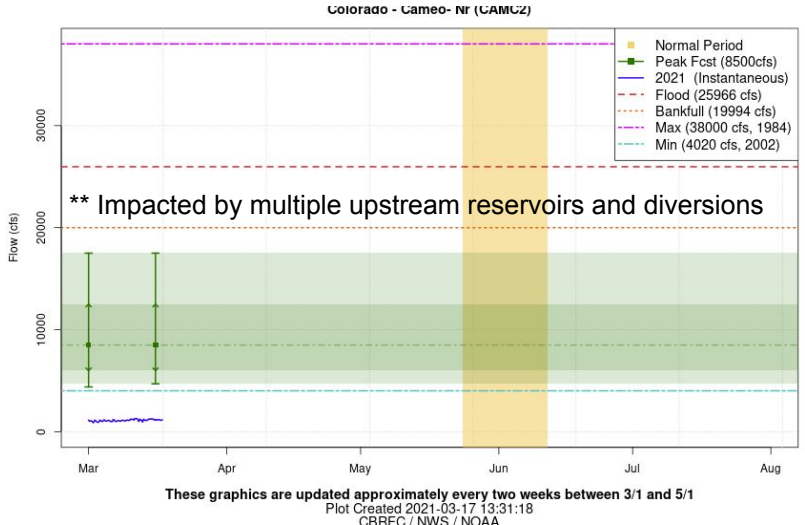
Forecast Range:	**5000-15000 CFS**
50% Forecast:	**9000 CFS**
Average:	13470 CFS
Flood:	20750 CFS
Last Year:	12800 CFS
Current Forecast Rank:	*26/36 (30th percentile)*

Peak Flow Forecasts: Upper Colorado River Mainstem



Eagle River - Gypsum

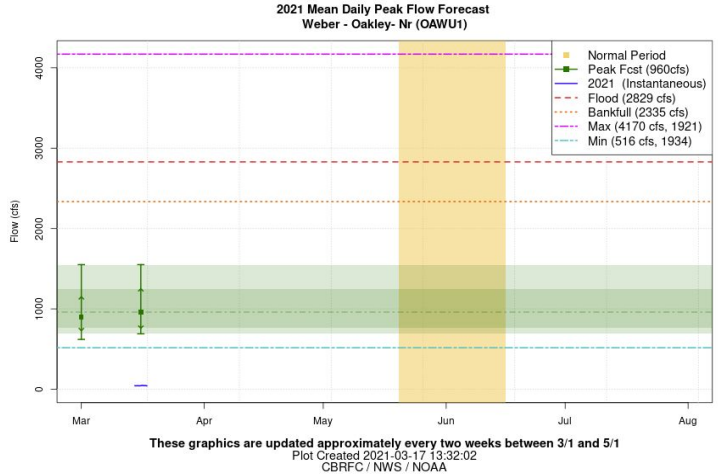
Forecast Range:	**1100-3600 CFS**
50% Forecast:	**1900 CFS**
Average:	3600 CFS
Flood:	6000 CFS
Last Year:	2940 CFS



Colorado River - Cameo

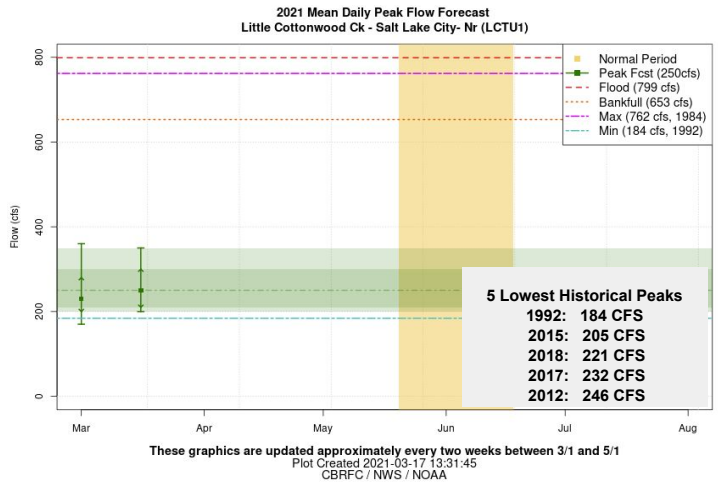
Forecast Range:	**4700-17500 CFS**
50% Forecast:	**8500 CFS**
Average:	17000 CFS
Flood:	26000 CFS
Last Year:	12800 CFS

Peak Flow Forecasts: Great Basin



Weber River - Oakley

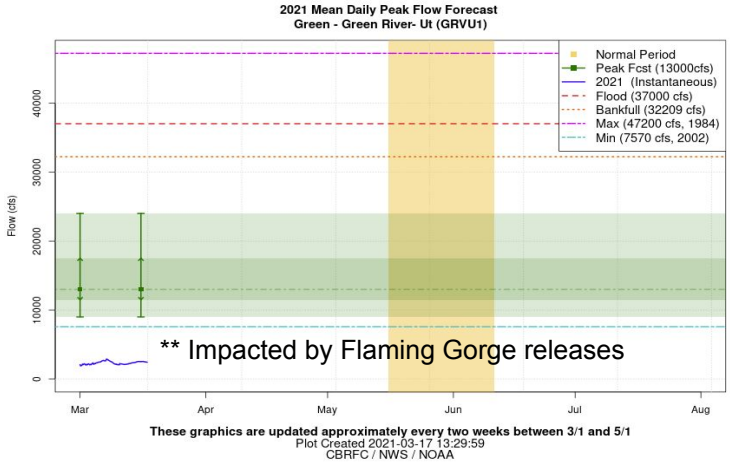
Forecast Range:	**690-1550 CFS**
50% Forecast:	**960 CFS**
Average:	1650 CFS
Flood:	2830 CFS
Last Year:	1480 CFS
Current Forecast Rank:	*105/116 (10th percentile)*



Little Cottonwood - Salt Lake City

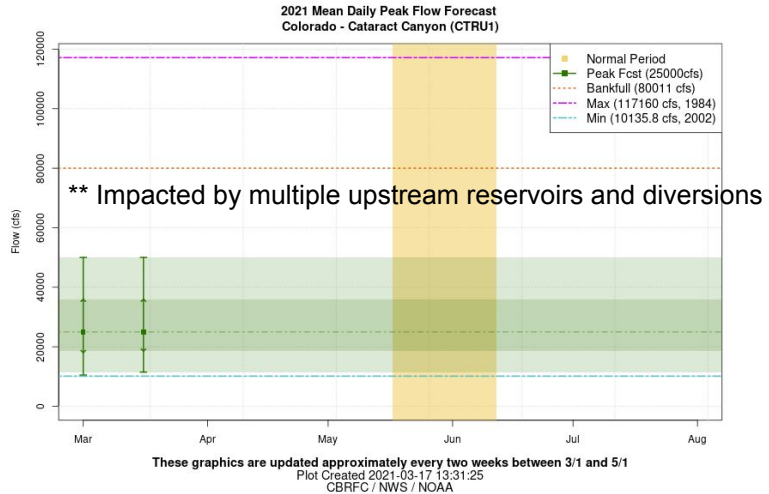
Forecast Range:	**200-350 CFS**
50% Forecast:	**250 CFS**
Average:	455 CFS
Flood:	800 CFS
Last Year:	408 CFS
Current Forecast Rank:	*56/60 (8th percentile)*

Peak Flow Forecasts: Southeast Utah Green & Colorado River Basins



Green River - Green River

Forecast Range:	**9000-24000 CFS**
50% Forecast:	**13000 CFS**
Average:	21700 CFS
Flood:	37000 CFS
Last Year:	20000 CFS



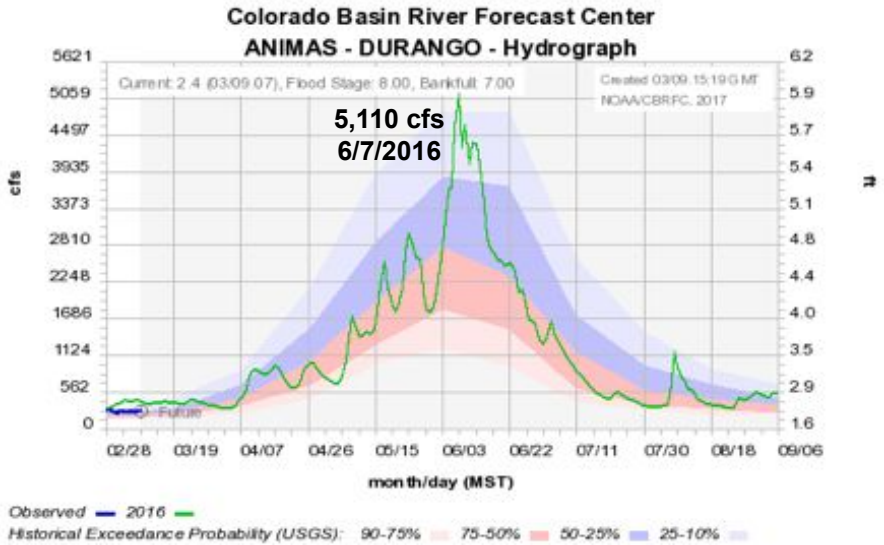
Colorado River - Cataract Canyon

Forecast Range:	**11500-50000 CFS**
50% Forecast:	**25000 CFS**
Average:	48000 CFS
Last Year:	33618 CFS

Impacts of Spring Weather (Temperature)

Animas River at Durango, CO - March 1, 2016 Peak Flow Forecast				
90%	75%	50%	25%	10%
2800	3100	3600	4300	4700

Normal Peak Period: 5/20 - 6/8

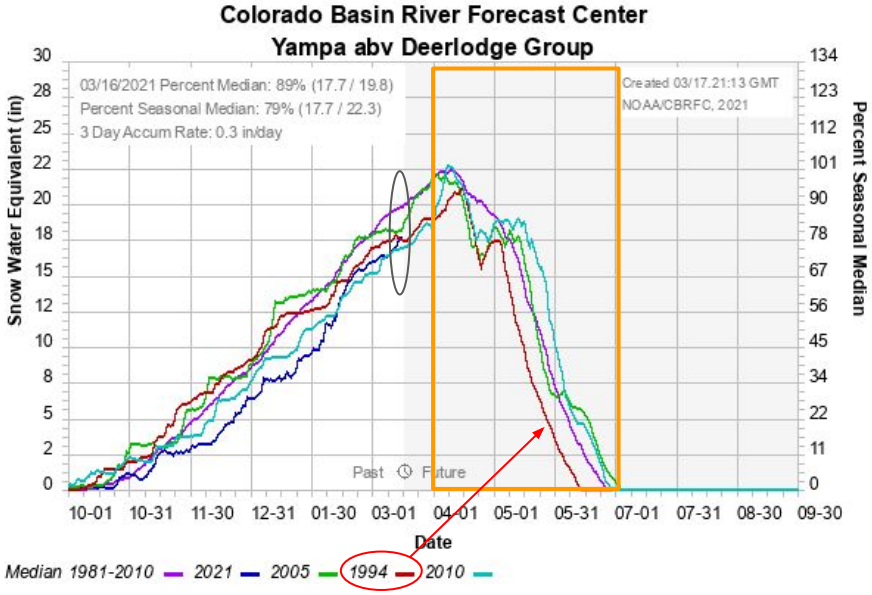


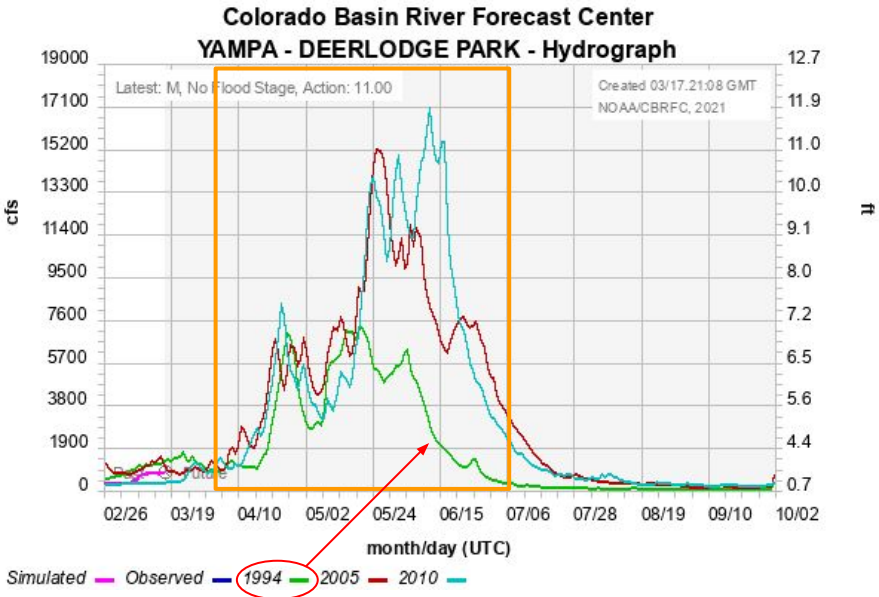
Durango, CO Temperatures

2-6 degrees below normal last 10 days of May

10 degrees above normal by June 5th

Impacts of Spring Weather





Year	Mid-Mar SWE (in)	Peak Flow (CFS)	Peak Flow Date
1994	17.5	7270	May 20
2005	18.2	15200	May 25
2010	16.9	17000	June 11
2021	17.7	*?9000?*	?

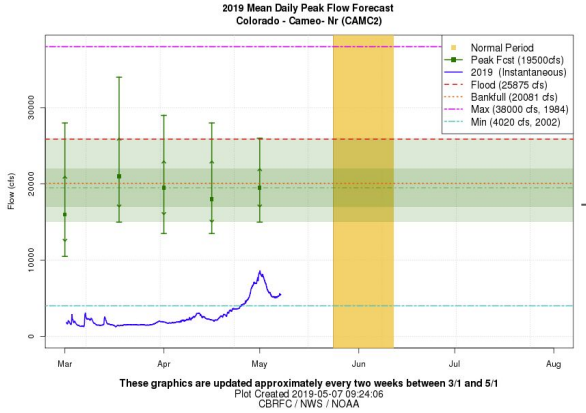
Normal time of peak: 5/11 - 6/4

Average peak: 13,470 cfs

Transition to using daily model for guidance

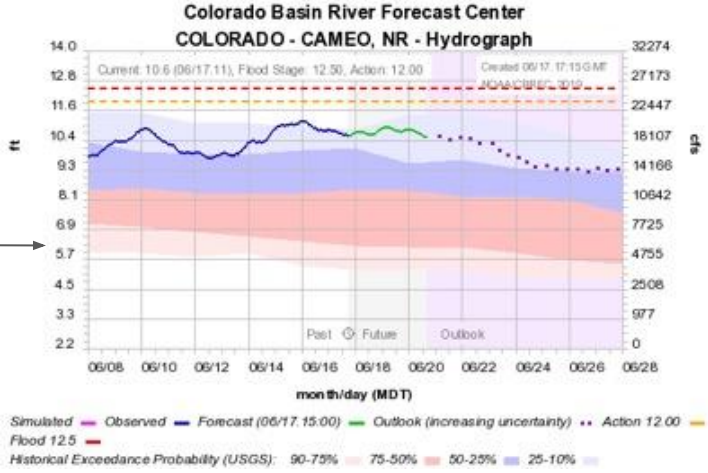
- As the time of peak nears, transition from using probabilistic guidance to using the daily deterministic forecasts.
- The deterministic model extends 10 days into the future and uses 7 days of precipitation forecasts (with zero for days 8-10) and 10 days of temperature forecasts from meteorological models.
  - The probabilistic model uses 7 days of both precipitation and temperature forecasts and then 35 years of historical data.
- The deterministic model includes observed (and planned, if known) reservoir releases and diversion flows that are extended through the forecast period and routed downstream.
  - The probabilistic model uses rules or historical operations.
- Deterministic forecast hydrographs can be accessed either from our front webpage or through the Peak Flow Dashboard.
  - The official mean daily peak flow graphics are discontinued and the forecast list indicates ‘peaking soon’ or ‘peak has already occurred’.

Probabilistic Peak Flow Forecast

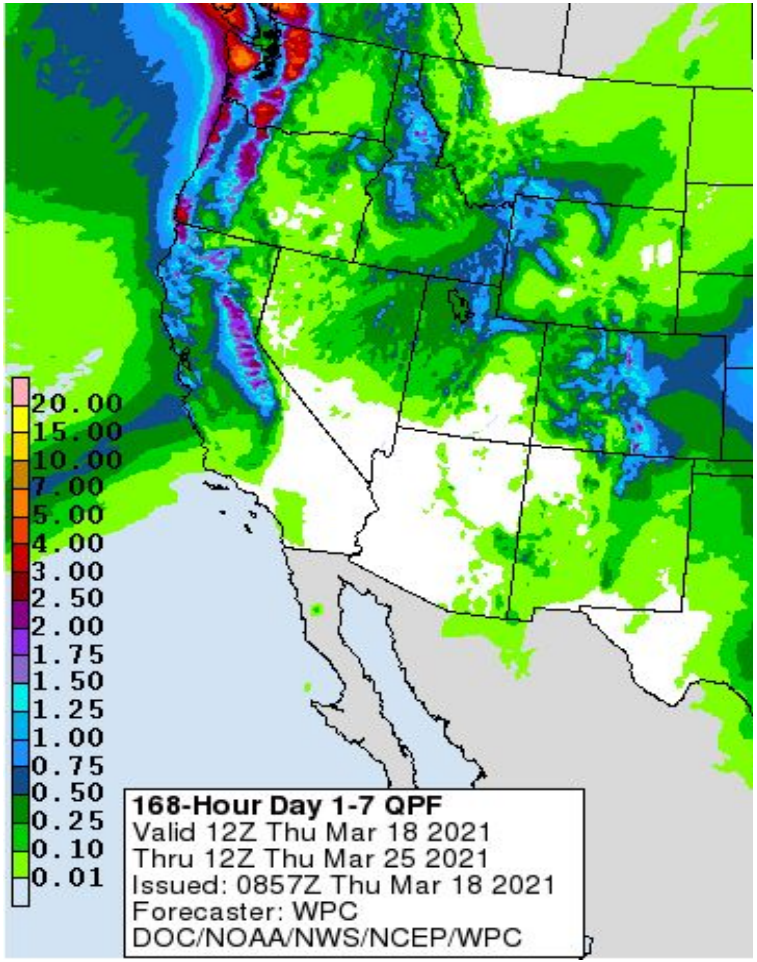


Peak Flow Dashboard

Deterministic Flow Forecast

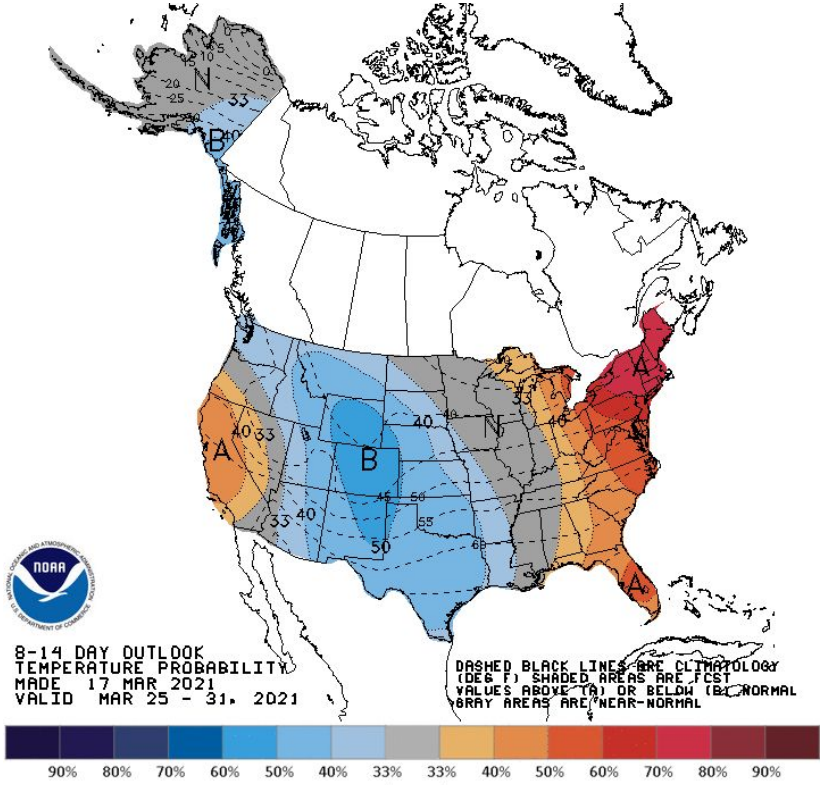


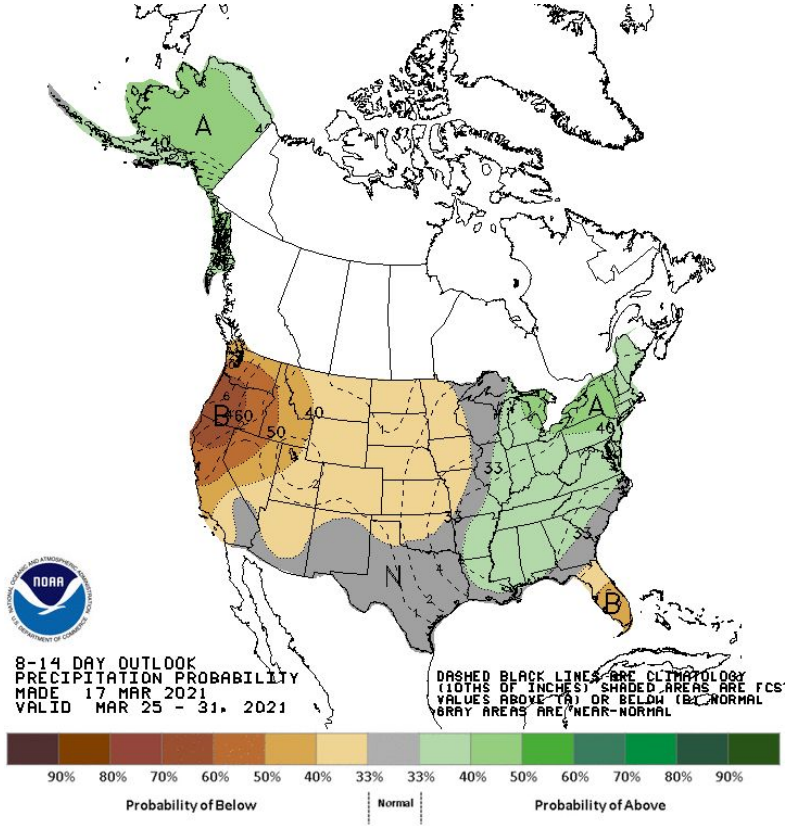
Upcoming Weather: WPC March 18 - 25 Precipitation Outlook



- Brief ridging across the region, followed by a trough this weekend (March 20-21) and a continued active pattern through much of next week.
- Below normal temperatures are forecast to continue through at least the middle of next week with some additional precipitation.
- Highest 7 day precipitation totals (0.5-1.5 inches) are forecast to be in the mountains of Colorado, Wyoming, and northern Utah.

Upcoming Weather: 8 to 14 day outlook (March 25-31)





Weather models suggest a northwesterly flow pattern for the last week of March. There are elevated odds for below normal temperatures and slightly elevated odds of below normal precipitation.

Peak Flow and Flood Threat Summary

- Snowmelt runoff peak flows are likely to be below average for most locations in the Great Basin and Colorado River Basin.
  - Will also likely be lower than last year’s peaks at most locations.

- While flooding is not expected at this time given current conditions, keep in mind:
  - Forecast procedures do not exist for all locations.
  - Rain events during snow melt can be cause for concern in any year.
  - In most cases the significance of any snowmelt flood threat doesn’t identify itself until April through mid-May.

- Peak flow forecasts have a high level of uncertainty and are highly dependent on Spring weather.

2021 Water Supply Webinar Schedule

**All Times Mountain Time (MT)*

Colorado River Basin		
~~Friday~~	~~Jan 8th~~	~~10 am~~
~~Friday~~	~~Feb 5th~~	~~10 am~~
~~Friday~~	~~Mar 5th~~	~~10 am~~
Wednesday	Apr 7th	10 am
Friday	May 7th	10 am

Utah/Great Basin		
~~Friday~~	~~Jan 8th~~	~~11:30 am~~
~~Friday~~	~~Feb 5th~~	~~11:30 am~~
~~Friday~~	~~Mar 5th~~	~~11:30 am~~
Wednesday	Apr 7th	11:30 am
Friday	May 7th	11:30 am

Peak flow forecast updates twice a month. Date/Times are subject to change.

Additional briefings scheduled as needed

Webinar schedule & registration information has been posted to the CBRFC web page

https://www.cbrfc.noaa.gov/

CBRFC Webinar Registration & Email List

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

Thursday December 17, 2020, 1:00 pm MT: CBRFC Early Season Water Supply Outlook Webinar. Reg
2021 Water Supply Forecast Webinar Schedule and Registration -> More Info...

ABOUT menu: Contact Us | Organization | Cooperating Offices | Papers and Presentations | Projects | Downloads

NEWS menu: CBRFC News | Email Updates | RSS

CBRFC Water Supply Forecast Webinar Schedule & Registration - Water Year 2021

The Colorado Basin River Forecast Center (CBRFC) produces water supply forecasts for the Colorado River Basin and the east
CBRFC conducts December through May webinars explaining the forecasts and current conditions.

Follow the links below to register for a webinar.

Early Season Water Supply Outlook Webinar
Thursday Dec 17 @ 1 pm MT

Colorado River Basin Water Supply Webinars
Friday January 8th @ 10 am MT
Friday February 5th @ 10 am MT
Friday March 5th @ 10 am MT
Wednesday April 7th @ 10 am MT
Friday May 7th @ 10 am MT

Utah Water Supply Webinars
Friday January 8th @ 11:30 am MT
Friday February 5th @ 11:30 am MT
Friday March 5th @ 11:30 am MT
Wednesday April 7th @ 11:30 am MT
Friday May 7th @ 11:30 am MT

Peak Flow Webinar
Thursday March 18th @ 10 am MT

A notification email will be sent if a date or time change occurs. Additional webinars are scheduled as needed.
The webinar slides will be available from the CBRFC presentations page soon after each briefing.

webinar slides and recordings

email **cbrfc.webmasters@noaa.gov**
subject line: **email notification list**

This list is used to provide notification when webinars are scheduled, water supply forecasts are updated, and for other news of interest to our stakeholders regarding CBRFC operations.

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Weber, Provo

Cody Moser
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Brent Bernard
Bear, Sevier, Six Creeks

Zach Finch
Lower Colorado River Basin

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Hydrometeorologist

CBRFC Webpage
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801-524-4004

CBRFC Water Supply Presentations
https://www.cbrfc.noaa.gov/present/present.php