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
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**
- Map indicates historical rank
  - Blue = High peak
  - Green ~ Normal peak
  - Red = Low peak

**Official Mean Daily Peak Flow Forecast Points**
- Map indicates probability of reaching flood flow
  - Green = Low Probability
  - Red = High Probability

*Map indicates that downstream highly regulated points drop while headwater points add.*
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

### Peak Flood Probability Legend
- No Forecast
- No Flood Stage
- $<5$
- $5-10$
- $10-25$
- $>25$

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

### Select by Area: CBRFC, Green, Colorado, San Juan, Great, Sevier, Virgin, Lou Col

### Columns (on/off):
- ID, River, Location, Flood Flow, PI, Issue Date, Observed Peak to Date, Observed Dates, Historic Peak, Hist Peak Date, Average Peak, Normal Earliest Date, Normal Latest Date, Last Year Peak, Last Year Late

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

### Click ID to view point info.

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<th>Flood Flow</th>
<th>PI</th>
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<th>Observed Peak to Date</th>
<th>Observed Dates</th>
<th>Historic Peak</th>
<th>Hist Peak Date</th>
<th>Average Peak</th>
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<td>4730</td>
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*Note: Peak Flow Forecasts are Regulated Forecasts Based on Upstream Diversions and Regulation.*

*Note: Peak Flow Forecasts on the Green River Below Planning Date for Reservoirs Are Based On Upper Planning Rega.*

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Peak Flow Graphic Overview

2021 Mean Daily Peak Flow Forecast
Colorado - Dotsero- Nr (EGLC2)

- Normal time of peak
- Forecast Issuance Date
- Minimum peak of record
- Maximum peak of record
- Flood Flow
- Bankfull Flow
- 10% Forecast Probability
- 25%
- 50% = Official Peak Forecast
- 75%
- 90%
- Current Observed Streamflow
- 10% Forecast Probability
- 25%
- 50% = Official Peak Forecast
- 75%
- 90%
- Minimum peak of record
- Normal time of peak

Flow (cfs)
- 0
- 5000
- 10000
- 15000
- 20000

Mar Apr May Jun Jul Aug

Forecast Issuance Date

Notes: These are updated approximately every two weeks between 3/1 and 5/1

Plot Created: 2021-03-17 13:31:10
CBRFC / NWS / NOAA
Select to plot min and max year hydrographs.
Peak Flow Dashboard

STM: Yampa - Steamboat Springs
Rank: 102 / 113 (10%)
Peak Flow Dashboard

Long Range Probabilistic Peak Flow Guidance: Planning Tool

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

Supplemental Information

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

ESP Tables includes:
- Probability of peak magnitude
- Probability of peak date
- Likelihood for date of peak whatever the magnitude
- \( \rightarrow 90\% \) magnitude not forecast to occur at 90\% date of peak
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

- No Data
- Low
- <10
- 10-25
- 25-50
- 50-75
- 75-90
- >90
- High
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

**Impacted by upstream regulation**

**Colorado River - Cameo**

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

**Impacted by multiple upstream reservoirs and diversions**
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

** Impacted by Flaming Gorge releases

Colorado River - Cataract Canyon

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

** Impacted by multiple upstream reservoirs and diversions
Impacts of Spring Weather (Temperature)

Animas River at Durango, CO - March 1, 2016 Peak Flow Forecast

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<td>25%</td>
<td>4300</td>
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<td>10%</td>
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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

<table>
<thead>
<tr>
<th>Year</th>
<th>Mid-Mar SWE (in)</th>
<th>Peak Flow (CFS)</th>
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<td>17.5</td>
<td>7270</td>
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<td>15200</td>
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<td>2010</td>
<td>16.9</td>
<td>17000</td>
<td>June 11</td>
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<tr>
<td>2021</td>
<td>17.7</td>
<td>?9000?</td>
<td>?</td>
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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](image1)

![Peak Flow Dashboard](image2)

![Deterministic Flow Forecast](image3)
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)*

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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
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 eastern Great Basin. 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, December 17, 2020, 1:00 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.

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.
CBRFC Contacts & WY21 Basin Focal Points

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Upper Green, Yampa
San Juan, Dolores, Powell

Patrick Kormos
Lower Green, Duchesne
Weber, Provo

Cody Moser
Upper CO Mainstem, Gunnison

Brent Bernard
Bear, Sevier, Six Creeks

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CBRFC Water Supply Presentations
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