Colorado Basin Water Supply Briefing

March 7 2018

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Colorado Basin River Forecast Center

Phone: 1-877-929-0660
Passcode: 1706374

Please mute your phone until the question period
February Weather – Pattern change mid month- more active weather

Current Snowpack Conditions-Still dismal in most areas

2018 Water Supply Forecasts – March update

Select Forecast Site Review – Where are forecasts trending?

March Forecast Error – Much improvement over February?

Upcoming Weather – Any chance to improve the situation?

Takeaways – Low runoff likely many areas – climatologically running out of time

Contacts & Questions

Phone: 1-877-929-0660 Passcode: 1706374

* Please mute your phone until the question period *
February Weather: Started the month dominated by high pressure ridge

Feb 7th 2018

Strong High Pressure

Northwest Flow

Phone: 1-877-929-0660
Passcode: 1706374
February Weather: Mid month pattern change as a trough of low pressure developed. This opened the door to more active weather with an increase in storms / precipitation.

Phone: 1-877-929-0660
Passcode: 1706374
February weather pattern – Mid month pattern change

Mean Atmospheric Pattern
February 2018

First half of February
High pressure ridge – mostly dry conditions

Second half of February
Increase in storm activity / precipitation
February Weather: February Precipitation (% of average)

Gunnison & Dolores Basins – Last time precipitation was average or better was July 2017

Majority of Lower Colorado River Basin AZ/NM has been below average dating back to July 2017
February Weather: Water Year Precipitation

Water Year Breakdown
(Basin mean precipitation as a % of average)

Above Fontenelle

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Gila
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* Less than 5% of average
Snow Conditions – SNOTEL Snow Water Equivalent (1981-2010 % of median)

February 6th 2018

March 6th 2018
Snow Conditions – Where did conditions stay the same or improve (as a % of median)?

1. **Colorado Basin River Forecast Center**
   - **NVRN5 San Juan Group**
   - Percent Median To Date: 58% (9.9 / 17.1)
   - Percent Seasonal Median: 49% (9.9 / 20.2)
   - Accumulation rate 0.0 in/day averaged over last 3 days.
   - + 25% of median

2. **Colorado Basin River Forecast Center**
   - **BlueMesa Group**
   - Percent Median To Date: 75% (10.3 / 13.8)
   - Percent Seasonal Median: 59% (10.3 / 17.6)
   - Accumulation rate 0.0 in/day averaged over last 3 days.
   - + 10% of median

3. **Colorado Basin River Forecast Center**
   - **DRGC2 Animas Group**
   - Percent Median To Date: 53% (6.4 / 15.9)
   - Percent Seasonal Median: 46% (6.4 / 18.2)
   - Melt rate 0.0 in/day averaged over last 3 days.
   - + 15% of median

4. **Colorado Basin River Forecast Center**
   - **Dolores River Basin Group**
   - Percent Median To Date: 54% (6.9 / 12.5)
   - Percent Seasonal Median: 48% (6.9 / 14.0)
   - Accumulation rate 0.0 in/day averaged over last 3 days.
   - + 10% of median
Snow Conditions – Where did conditions stay the same or improve (as a % of median) ?

**Upper Green Group**
- Percent Median To Date: 109% (12.7 / 11.7)
- Percent Seasonal Median: 90% (12.7 / 14.2)
- Accumulation rate 0.1 in/day averaged over last 3 days.

**Yampa Group**
- Percent Median To Date: 71% (13.2 / 18.3)
- Percent Seasonal Median: 59% (13.2 / 22.3)
- Accumulation rate 0.1 in/day averaged over last 3 days.

**CAMC2 Colorado River abv Cameo LONG Group**
- Percent Median To Date: 70% (10.8 / 13.4)
- Percent Seasonal Median: 65% (10.5 / 15.4)
- Accumulation rate 0.0 in/day averaged over last 3 days.

**Virgin Group**
- Percent Median To Date: 50% (5.9 / 11.9)
- Percent Seasonal Median: 44% (5.9 / 13.4)
- Accumulation rate 0.1 in/day averaged over last 3 days.

Minor changes

+ 10-15 % of median
Snow Conditions – Where did conditions stay the same or improve (as a % of median)?

Early February to Early March
Increase from near 10% to near 40% of median
Snow Conditions – Where did conditions get worse (as a % of median)?
Snow Conditions – A lot of sites still at record lows

SWE Historical Rankings

February 6th 2018

Red – Lowest on record
Orange – Bottom 2-4 of record

March 6th 2018

No Data
Low
<10
10-25
25-75
75-90
>90
High
Snow Condition (as represented in the hydrologic model)

Snow Conditions - February 06 2018
(Modelled, Major Contributing Areas)

% Median SWE
- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%

Snow Conditions - March 06 2018
(Modelled, Major Contributing Areas)

% Median SWE
- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%
Soil Moisture Impacts (entering winter, prior to the onset of snow)

Greatest impacts are where snowpack conditions and soil moisture show the same signal. Impact forecast volumes +/- 5 - 10% of average.
Below average precipitation dates back to August
Any precipitation events are unlikely to produce significant runoff initially—climatology indicates drier period ahead
Above average precipitation in Gila Basin in February produced near to below median runoff
Forecasts as of Mar 1 2018

Volume 1000’s acre feet / % of 1981-2010 average

- Fontenelle: 840 / 116%
- Yampa-Deerlodge: 790 / 64%
- Flaming Gorge: 940 / 96%
- Little Snake-Lily: 195 / 57%
- Yampa-Warren Bridge: 310 / 127%
- Duchesne-Randlett: 133 / 35%
- White-Watson: 158 / 56%
- Elk-Milner: 245 / 77%

Forecast range: ~ 30%-125% average

Duchesne:
- Decrease of 5-10% of average

Upper Green:
- Increase of 0-15% of average
Upper Colorado: Colorado River Mainstem

Forecasts as of Mar 1 2018
Volume in 1000’s acre-feet / % of 1981-2010 average

Forecast range: ~ 35%-95% average
Increase of 0-5% of average

- Plateau Ck - Cameo 45/ 36%
- Colorado-Cameo 1630/ 69%
- Eagle-Gypsum 1060/ 76%
- Roaring Fork-Glenwood 460 / 67%
- Williams Fork Res 80/ 83%
- Ruedi Res 94 / 68%
- Granby Res 190/ 86%
- Dillon Res 145 / 89%
Upper Colorado: Gunnison and Dolores Basins

Forecasts as of Mar 1 2018

Volume in 1000’s acre-feet / % of 1981-2010 average

Forecast range: ~ 25 to 75% average
Change of -1 to +5% of average
Upper Colorado: San Juan Basin

Forecasts as of Mar 1 2018
Volume in 1000’s acre-feet / % of 1981-2010 average

Forecast range: ~ 30%-65% average
Change of -1% to +8% of average
Upper Colorado
April-July Streamflow Volume Forecasts
(% of 1981-2010 average)

Forecast as of Mar 1 2018

Lake Powell:
3400 KAF / 47 % average

No change from Feb 1st
Lake Powell – Forecast Inflow Distribution Comparison – 2018 vs Historical Average

This chart available at: www.cbrfc.noaa.gov - water supply drop down menu - select: Upper Colorado Situational Awareness

April - July Unregulated Inflow into Lake Powell
As of 2018-03-01

**Average Streamflow Contribution**
- Green: 33.6%
- San Juan: 12.5%
- Colorado/Cameo: 26.8%
- Gunnison: 16.8%
- Other: 10.3%

**March Final Forecast**
- Green: 39.4%
- San Juan: 7.3%
- Colorado/Cameo: 33.5%
- Gunnison: 14.9%
- Other: 4.9%

Current Forecast: 3400 KAF
Min. Probable: 2200 KAF
Max. Probable: 5700 KAF

Historical Min (year): 964 KAF (2002)
Historical Avg: 7160 KAF
Historical Max (year): 15316 KAF (1984)

Averages are over the 1981 - 2010 period
Lower Colorado (Virgin River) April-July Streamflow Volume Forecasts

Forecasts as of Mar 1 2018

Forecast range:
~ 20%-50% average
~40-65% median
Decrease of 2-4% of average
Lower Colorado Mar-May forecast streamflow volumes
(1000’s acre-feet / % of 1981-2010 median)

Forecasts as of Mar 1 2018

Forecast range: ~ 3%-40% median

* Mar-June forecast period
How are forecasts trending??

March Precipitation (first 6 days)

Month to Date Precipitation - March 06 2018
(Averaged by Basin)

Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov
Forecast Evolution Plot: Flaming Gorge Inflow

April-July Forecast: 96% of average

Water Supply Forecast

Green - Flaming Gorge Res, Flaming Gorge Dam, At (GRNU1)
Period: Apr-Jul, Official 50% Forecast (2018-03-01): 940 kaf (96% Average, 113% Median)
ESP is Unregulated and No Precipitation Forecast Included

- Jan 1 Fcst
- Feb 1 Fcst
- Mar 1 Fcst

50% exceedance forecast (the “official” forecast)

70% chance above the historical median

2018/03/01:
Max 1986: 2224.35
Min 1977: 254.3
Average: 980
Median: 830
ESP: 911

Official 10: 1420
Official 30: 1090
Official 50: 940
Official 70: 850
Official 90: 700
Forecast Evolution Plot: Yampa River @ Deerlodge

April-July Forecast 64% of average

Water Supply Forecast

Yampa - Deerlodge Park (YDLC2)
Period: Apr-Jul, Official 50% Forecast (2018-03-01): 750 kaf (64% Average, 68% Median)
ESP is Unregulated and No Precipitation Forecast Included

Less than 10% chance of reaching average
90% chance staying above min of record
April-July Forecast 86% of average

About a 30% chance of reaching average

Wetter scenario

Drier scenario
April-July Forecast 59% of average

Forecast undercut raw model guidance because short term precipitation outlook was on the dry side.

Model has trended lower since Mar 1st.
Forecast Evolution Plot: McPhee Reservoir Inflow

April-July Forecast 38% of average

Why this big drop on the max forecast trace after early March?
Prior to Mar 1\textsuperscript{st} the model was using 1995 as the maximum forecast trace, meaning in the historical record, there must have been a big storm that occurred beyond the forecast date, sometime in the spring.

Beyond Mar 2\textsuperscript{nd} the model started using a different year (1999) as the max forecast trace. So the storm must have occurred around late February or the first March 1995. Because as our forecast date advanced this storm no longer appeared in the historical record.
Dolores Basin – Late Feb/Early Mar 1995 Event

Beyond early Mar 1995 no longer impressive
But there were some later spring snow events in 1999.
As of March 6th:
The maximum forecast trace is 579 KAF (79% of average)
The minimum forecast trace is 138 KAF (19% of average)

Model has trended lower since Mar 1st
April-July Forecast 47% of average

About a 3% chance of reaching average inflow at Lake Powell
Forecast Validation: Historical model error improves February to March

Historical Model Error 1981-2010

Some improvement between February and March but it is minimal for some sites. Biggest 2 month improvement tends to be from Mar to May.

Forecasts are better than just going with average

Error tends to decrease each month into the spring

Where We Do Better:
- Headwaters
  - Primarily snow melt basins
  - Known diversions / demands

Where We Do Worse:
- Lower elevations (rain or early melt)
- Downstream of diversions / irrigation
- Little is known about diversions / demands
Current and Future weather – High pressure ridge currently over the area with dry conditions in the near term

This morning - Mar 7th 2018
Upcoming Weather: Very weak system moving through the mean ridge may bring light precipitation to parts of the upper Green and Yampa Basins. Insignificant amounts.

Sat Mar 10th

Shaded colors are areas of forecast precipitation

Fairly moist system is expected to move southern part of forecast area late Saturday through Sunday. Weak dynamics may limit precipitation amounts to generally .10 to .25 inches.
Upcoming Weather: High pressure ridge centered over the area resulting in dry conditions and above normal temperatures.
Upcoming Weather: The next best chance for precipitation as moisture kicks inland from the Low pressure system off the west coast. Confidence is low.

Fri Mar 16th

Models diverge on how to handle this system this far into the future.

But there is potential for a widespread precipitation event.

Sat Mar 17th

Models do not handle closed low pressures very well. Confidence in the 7-10 day precipitation potential is low.
Currently models favor highest precipitation amounts over the southern half of the area. This forecast is likely to vary a bit due to the nature of the storm system later next week.
Upcoming Weather and Impacts to Water Supply Forecasts

NWS Climate Prediction Center: Temperatures & Precipitation probability Mar 14 - Mar 20

Temperature Probabilities

Precipitation Probabilities
Long Range Weather Outlook: This model suggests warmer/drier the last week of March. Zonal flow component across the Pacific Ocean so pattern may remain progressive.

Confidence quite low this far into the future.
Several areas in the upper Colorado River Basin received near to above average precipitation in February. For southwest Colorado it was the first time in several months.

While there were some minor snowpack improvements conditions remain quite poor with the exception of the Green River Basin headwaters in Wyoming and headwaters of the Colorado Mainstem.

Forecasts increased in the Green River headwaters above Fontenelle Reservoir, increased slightly in the San Juan above Navajo Reservoir, decreased in the Duchesne, and changed little elsewhere. Lake Powell remained at 3.4 MAF or 47% of average.

On average the snow accumulation season runs into mid to late April in most runoff producing areas. As we get further into spring significant snow accumulation while possible, becomes much less likely. Especially true for southern Basins (San Juan, Dolores, Gunnison). March into early April can be a pivotal time period.

The first half of March is probably going to end up with precipitation below average. This may result in a decreasing trend in forecast guidance with the mid-month update. There potential for additional precipitation starting about mid March.
2018 water supply briefing schedule

2018 monthly water supply briefings for the Colorado Basin

Thursday Apr 5th @ 11 am MT
Monday May 7th @ 11 am MT

Great Basin/Utah webinars are same dates at 1:30 pm MT (there is one today)

Peak flow briefing Tues March 13th at 11 am MDT

Date/Times are subject to change. All registration information has been posted to the CBRFC web page.
Please contact us with any questions

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