March 2017
Colorado River Basin Water Supply Briefing

Mar 7, 2017

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National Weather Service
NOAA

Please mute your phone until ready to ask questions
February weather impacts:
Snowpack, soils, & water supply outlook

The latest snowpack conditions
Significant with some at record levels for early March

2017 water supply forecasts overview
Some forecasts are at record levels

March forecast error – an improvement over February?
March is a pivotal month

Upcoming weather – Potential impacts to water supply forecasts

Contacts & Questions

* Please mute your phone until ready to ask questions *
February Weather

Precipitation distribution over the month of February

Early February storm focused on northern areas (Duchesne, Upper Green River Basins)

The southern 2/3 of the CBRFC forecast area was below average for most of February

End of the month storm benefited the Lower Colorado River Basin & San Juan Basin
February Weather
We’ve seen this before – Atmospheric river

Significant moisture
February Weather

Extended period with very warm southwest flow
February Weather

Significant moisture
February Weather
Precipitation distribution by major river basins

Upper Colorado River Basin
Feb 2017 Precipitation (% average)

- Upper Green: 225%
- Yampa/White: 95%
- Duchesne: 165%
- Colorado Mainstem: 95%
- Gunnison: 100%
- Dolores: 110%
- San Juan: 110%

Monthly Precipitation - February 2017
(Averaged by Basin)
Once again impressive precipitation in the Green River Basin
Precipitation rankings for February 2017
February Weather
Precipitation distribution by major river basins

Lower Colorado River Basin
Feb 2017 Precipitation (% average)

Little Colorado: 110%
Salt: 110%
Gila: 95%
February Weather – Instantaneous Temperature Plots

Hickerson Park SNOTEL
Elevation: 9,145 Feet
Upper Green River Basin

Vail Mountain SNOTEL
Elevation: 10,300 Feet
Colorado River Headwaters
February Weather Temperatures

Some mean daily temperatures reached 15-25 degrees above average.
Current Model Soil Saturation Condition

Model representation of where areas are becoming saturated (dark green < 1 inch)

Primary Use: Where very efficient runoff is likely (due to additional snowmelt or rainfall)

Areas with large deficits: Typically high elevation areas under snowpack. Significant melt has not begun and red/orange categories are normal for this time of year

Not a representation of above/below average soil moisture conditions
Soil Moisture Impacts
Model Soil Moisture entering winter

2017 Water Supply Impacts:

• A driver of early season forecasts; higher/lower by 3-10% of average.

• In significant snowpack areas below average soil moisture less likely to have a large impact.

• Significant snowpack + wet soils could see more enhanced spring runoff
  • Upper Green and Duchesne river basins

This is representation of above/below average soil moisture conditions prior to snowmelt (valid at higher elevations of northern basins)
Snow Conditions

SNOTEL (% median): March 6, 2017

CBRFC MODEL SNOW (% median):

Snow Conditions - March 06 2017
(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%

Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov
Snow Conditions

Areas that are typically non contributors may play a part this year
Snow Conditions

SNOTEL ranking for March 6th 2017

Black – Highest on record

Dark Blue – Top 10% of record (most 2nd or 3rd)

Period of record 34-39 years most sites
February Weather: Impact to the snowpack

Colorado Basin River Forecast Center
Green abv Fontenelle Group

- Percent Median To Date: 187% (23.5 / 12.6)
- Percent Seasonal Median: 155% (23.5 / 15.1)
- Accumulation rate 0.1 in/day averaged over last 3 days.

Colorado Basin River Forecast Center
Duchesne River Group

- Percent Median To Date: 193% (22.3 / 12.2)
- Percent Seasonal Median: 161% (22.3 / 13.0)
- Accumulation rate 0.1 in/day averaged over last 3 days.

Colorado Basin River Forecast Center
Yampa abv Deerlodge Group

- Percent Median To Date: 111% (20.9 / 18.6)
- Percent Seasonal Median: 93% (20.8 / 22.3)
- Accumulation rate 0.1 in/day averaged over last 3 days.

Colorado Basin River Forecast Center
Colorado abv Cameo Group

- Percent Median To Date: 126% (16.4 / 13.0)
- Percent Seasonal Median: 102% (16.4 / 15.1)
- Accumulation rate 0.1 in/day averaged over last 3 days.
February Weather: Impact to the snowpack

Colorado Basin River Forecast Center
Blue Mesa Group

- Percent Median To Date: 168% (23.0 / 13.9)
- Percent Seasonal Median: 131% (23.0 / 17.6)
- Melting rate: 4.0 in/day averaged over last 3 days.

Dolores River Basin Group

- Percent Median To Date: 204% (21.0 / 10.3)
- Percent Seasonal Median: 191% (21.0 / 11.6)
- Accumulation rate: 0.1 in/day averaged over last 3 days.

Colorado Basin River Forecast Center
NVRN5 San Juan Group

- Percent Median To Date: 144% (24.5 / 17.1)
- Percent Seasonal Median: 121% (24.3 / 20.2)
- Accumulation rate: 0.1 in/day averaged over last 3 days.

Virgin Group

- Percent Median To Date: 151% (13.7 / 9.1)
- Percent Seasonal Median: 145% (13.7 / 9.1)
- Accumulation rate: 0.1 in/day averaged over last 3 days.
Upper Colorado April-July Streamflow Volume Forecasts (% of 1981-2010 average)
Forecasts as of Mar 1 2017

- Fontenelle: 1680 KAF / 232%
- Flaming Gorge: 2260 KAF / 231%
- McPhee Res: 440 KAF / 149%
- Lake Powell: 10400 KAF / 145%
- Navajo Res: 840 KAF / 114%
- Yampa-Deerlodge: 1500 KAF / 121%
- Blue Mesa: 970 KAF / 144%
- Colorado-Cameo: 2780 KAF / 118%
- Duchesne-Randlett: 800 KAF / 207%

Forecasted percent averages changes from 10% decrease to 65% increase since Feb 1
Lower Colorado (Virgin River)
April-July Streamflow Volume Forecasts
(% of 1981-2010 average / median)

Virgin-Virgin: 64 KAF / 110% avg / 156% med

Santa Clara – Pine Valley: 4.7 KAF / 94% avg / 147% med

Forecasts as of Mar 1 2017
Lower Colorado Mar-May Streamflow Volume Volume Forecasts
(% of 1981-2010 median)

Forecasts as of Mar 1 2017

- Salt-Roosevelt: 230 KAF / 95% med
- Verde-Horseshoe: 194 KAF / 181% med
- Little Colorado-Lyman: 4.1 KAF / 68% med
- Gila-Gila: 55 KAF / 162% med
CBRFC Model Soil Moisture

Winter rain and snowmelt impacts to soil moisture in the Lower Colorado River Basin

Feb 6 2017

Mar 6 2017

Verde River

Salt River headwaters

Gila River headwaters

Salt River headwaters

Gila River headwaters

% Average
- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%
Forecast Evolution Plot: Flaming Gorge Inflow

Daily Model Guidance

Just uses 35 year climatological precipitation ensemble into future

>50% chance of exceeding historical maximum runoff volume this year
1986: 2224 kaf / 227%

Basically no chance of not exceeding average runoff volume this year

Plots are available at: https://www.cbrfc.noaa.gov
Select WATER SUPPLY from the top menu
Click on desired location for pop-up, click again for full screen
Including the next 5 days of deterministic Quantitative Precipitation Forecast (QPF) increases 50% forecast to:

2363 KAF / 242% avg
Forecast Evolution Plot: Fontenelle Inflow

Record Max = 1683 in 1986

1680 kaf / 232%
1200 kaf / 166%
930 kaf / 128%

The latest (2017-03-06) 50% ESP forecast is 1579 kaf.
Plot Created 2017-03-06 11:56:23, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.
Forecast Evolution Plot: Duchesne-Randlett

Duchesne - Randlett- Nr (DURU1) 2017-03-01 Apr-Jul Official 50% Forecast: 800 kaf (208% of average)
ESP is Unregulated and No Precipitation Forecast Included

Model minimum forecast trace is 144% of average.

The latest (2017-03-06) 50% ESP forecast is 777 kaf.
Plot Created 2017-03-06 11:52:47, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.
Forecast Evolution Plot: Yampa – Deerlodge Park

Yampa - Deerlodge Park (YDLC2)
2017-03-01 Apr-Jul Official 50% Forecast: 1500 kaf (121% of average)
ESP is Unregulated and No Precipitation Forecast Included

The latest (2017-03-06) 50% ESP forecast is 1441 kaf.
Plot Created 2017-03-06 12:29:58, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.
Forecast Evolution Plot: Colorado near Cameo

Colorado - Cameo - Nr (CAMC2)
2017-03-01 Apr-Jul Official 50% Forecast: 2780 kaf (118% of average)
ESP is Unregulated and No Precipitation Forecast Included

Max/Min
ESP 90%
ESP 80-70%
ESP 60-90%
Official

Volume (kaf)

Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep

The latest (2017-03-05) 50% ESP forecast is 2655 kaf.
Plot Created 2017-03-05 11:47:06, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.
Forecast Evolution Plot: Taylor – Taylor Park Inflow

Other big snow years
1984: 168 KAF
2008: 135 KAF
1982: 110 KAF

The latest (2017-03-06) 50% ESP forecast is 121 kaf.
Plot Created 2017-03-06 12:18:36, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.
Forecast Evolution Plot: Gunnison – Blue Mesa Inflow

Forecast increased at February mid-month, no change since.
Forecast Evolution Plot: Dolores – McPhee Reservoir Inflow

Did not follow model guidance increase due to anticipated dry start to March

Similar Snow Year
1997: 461 KAF
2008: 374 KAF

The latest (2017-03-06) 50% ESP forecast is 454 kaf.
Plot Created 2017-03-06 12:06:49, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.
Model decreased through mid-month due to dry conditions. No change since then due to wet finale to end February.

Similar Snow Year
1989: 470 KAF
1995: 1141 KAF
1997: 1022 KAF
Forecast Evolution Plot: Animas - Durango

Forecast Target Period

Similar Snow Year
1995: 608 KAF
But a very late melt

The latest (2017-03-06) 50% ESP forecast is 527 kaf.
Plot Created 2017-03-06 11:52:30, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.
Mar 1st forecast is an increase of 600 KAF since mid February.
Forecast Validation: How good are forecasts in March?

Historical Model Error 1981-2010

Not a significant change in model error Feb to Mar. March can be a pivotal month.

Forecasts are better than just going with average.

Error tends to decrease each month into the spring, especially from this point forward.

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

Map is available at:
https://www.cbrfc.noaa.gov/arc/verif/verif.php

From Water Supply drop down menu → select Historical Verification Map

% Model Error February to March April-July Forecast

- Green-Warren Bridge: Feb 15% Mar 15%
- Yampa-Deerlodge: Feb 25% Mar 23%
- Blue Mesilla: Feb 22% Mar 22%
- Animas-Durango: Feb 15% Mar 15%
- Lake Powell: Feb 24% Mar 24%
- Blue Mesa: Feb 20% Mar 18%
- Blue - Dillon: Feb 17% Mar 16%
March Weather: Precipitation so far….
Upcoming Weather and Impacts to Water Supply Forecasts

Westerly flow over the area with storm track to the north

This morning 3/7/17
Upcoming Weather and Impacts to Water Supply Forecasts

Westerly flow continues over the area with storm systems displaced north. Increasingly mild air mass with temperatures 5-15 degrees above average for this time of year.
Upcoming Weather and Impacts to Water Supply Forecasts

This model suggests the storm track remains to the north of the area. Other solutions have the high pressure ridge farther west. That scenario would allow our northern areas to become more susceptible to storm activity.
Upcoming Weather and Impacts to Water Supply Forecasts

The next legitimate threat for any significant precipitation looks to be the middle of next week. Models differ on the intensity of the storm system but it does appear more active. However southern areas remain on the dry side.
Upcoming Weather and Impacts to Water Supply Forecasts

Precipitation Forecast: 7 day total (Mar 7\textsuperscript{th}-Mar 14\textsuperscript{th})
Significant runoff is anticipated particularly in the Upper Green River Basin, Duchesne River Basin, Dolores River Basin, & Gunnison Basin headwaters.

Even if conditions turn dry these areas are still likely to have much above average runoff. Greatest impacts of dry weather to water supply forecasts would be in parts of the Yampa, Colorado Mainstem, and San Juan River Basins.

March is starting off dry and will most likely be below average through the middle of the month. An important factor will be temperatures and how much snowpack is retained through the month.

Mid-Month water supply guidance is unlikely to increase and will probably decrease some in many areas.

CBRFC deterministic model is indicating some streams starting to increase by next week due to snow melt. These are generally lower elevation basins and southern basins (Virgin, Dolores, San Juan) and in line with seasonal rises.

We are also seeing active reservoir operation activity in anticipation of the high inflow forecasts.
Stream flow increases as forecast by the CBRFC deterministic model.
2017 water supply briefing schedule

- 2017 monthly water supply briefings for the Colorado River Basin
  - Thursday Apr 6th @ 11 am MT
  - Friday May 5th @ 11 am MT
  - Great Basin webinars are same dates at 1:30 pm MT
    - NEXT UP: Today 1:30 pm

- Peak flow briefing: Friday March 10th @ 10 am MT

- Date/Times are subject to change. All registration information has been posted to the CBRFC web page.
CBRFC Water Supply Contacts

Please contact us with any questions

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