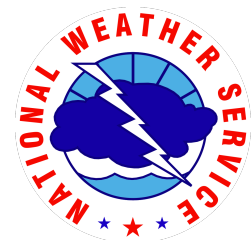


Green and Yampa Rivers: Current Conditions and Forecasts

April 20, 2017

Flaming Gorge Working Group Meeting

Ashley Nielson-Senior Hydrologist
Colorado Basin River Forecast Center
National Weather Service/NOAA



Today's Presentation

Seasonal Weather Review: Impacts to water supply conditions

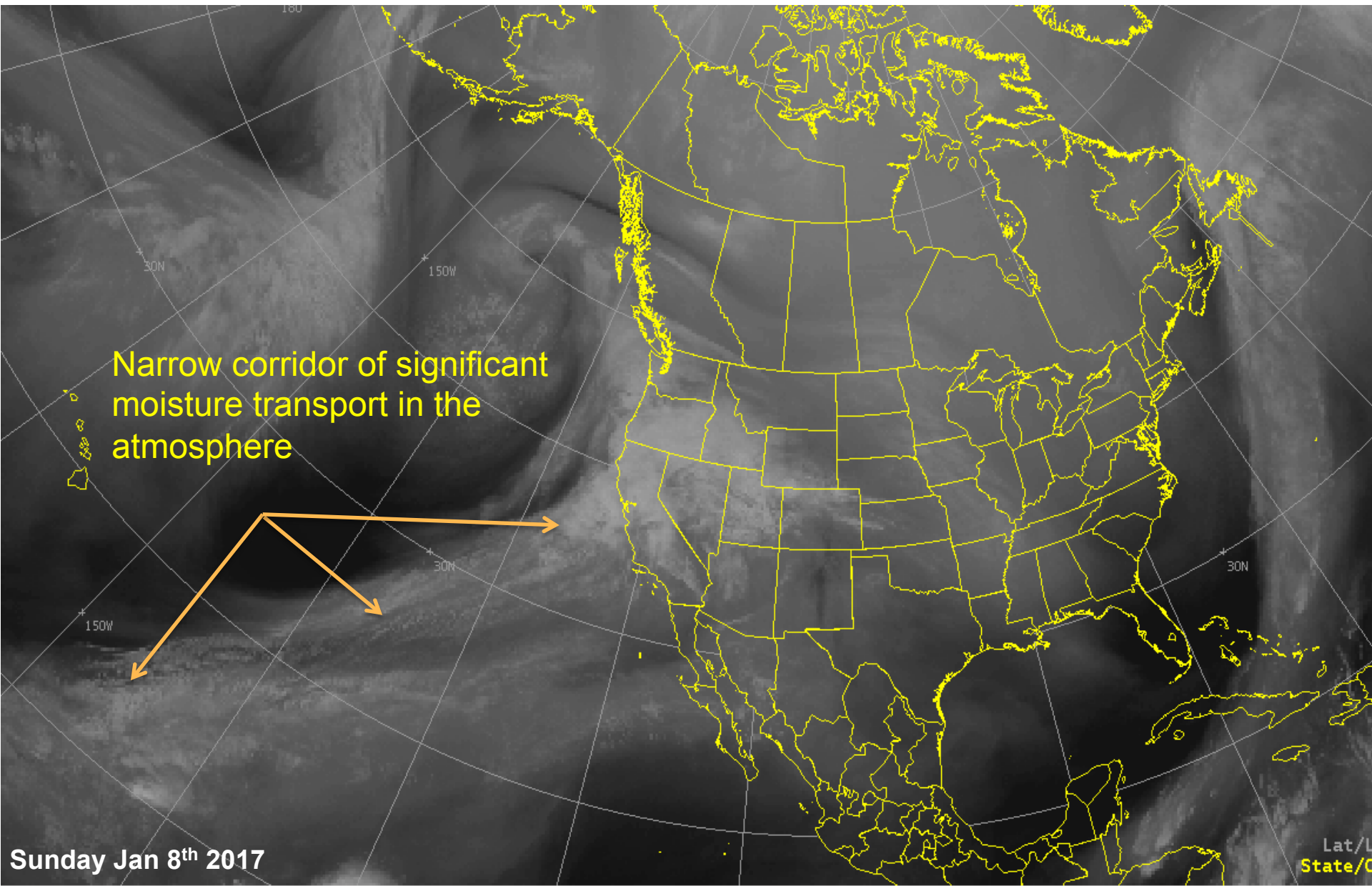
April 2017 Water Supply Forecasts Overview

- April-July Water Supply Volumes
 - Flaming Gorge Reservoir
 - Yampa River
- Peak Flow Forecasts
 - Green River
 - Yampa River

How good are the forecasts?

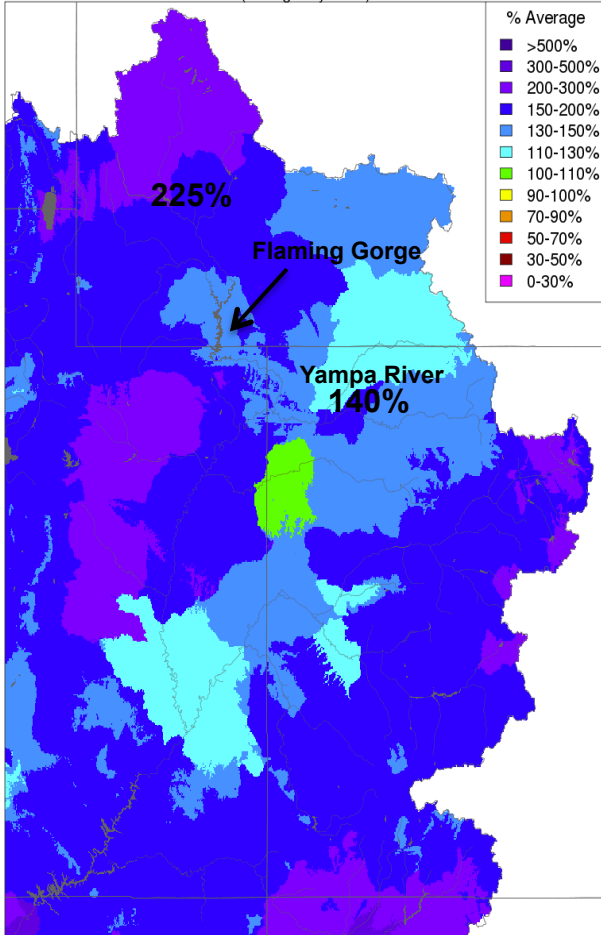
- Forecast error and uncertainty

Mid December through February: "Atmospheric Rivers"



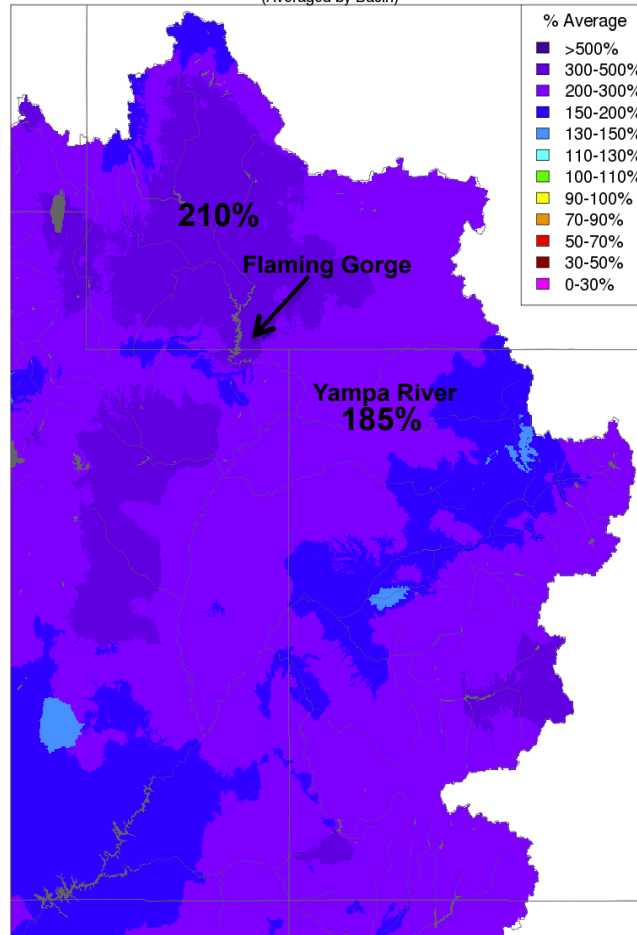
Weather Review: Winter Precipitation (Dec-Feb)

Monthly Precipitation - December 2016
(Averaged by Basin)



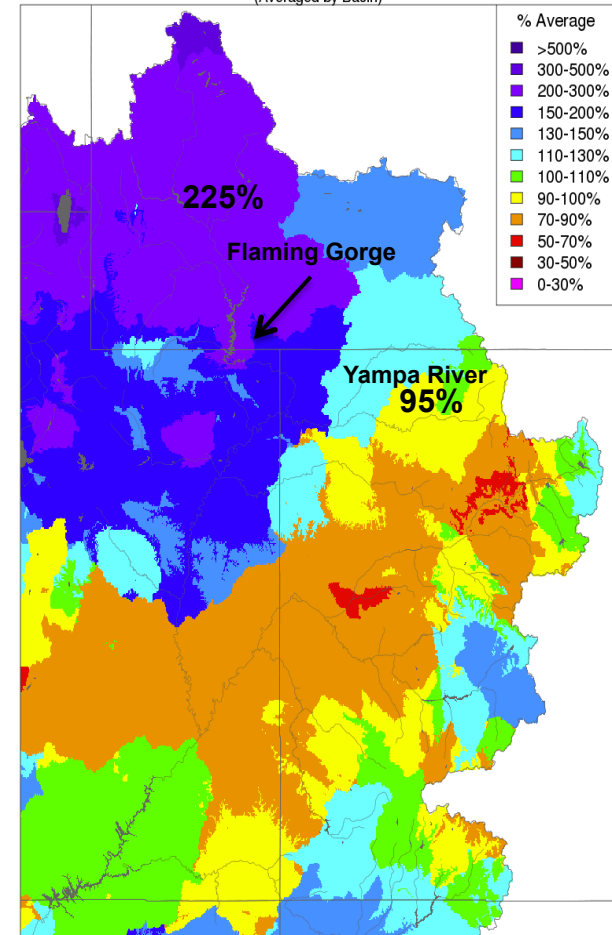
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Monthly Precipitation - January 2017
(Averaged by Basin)

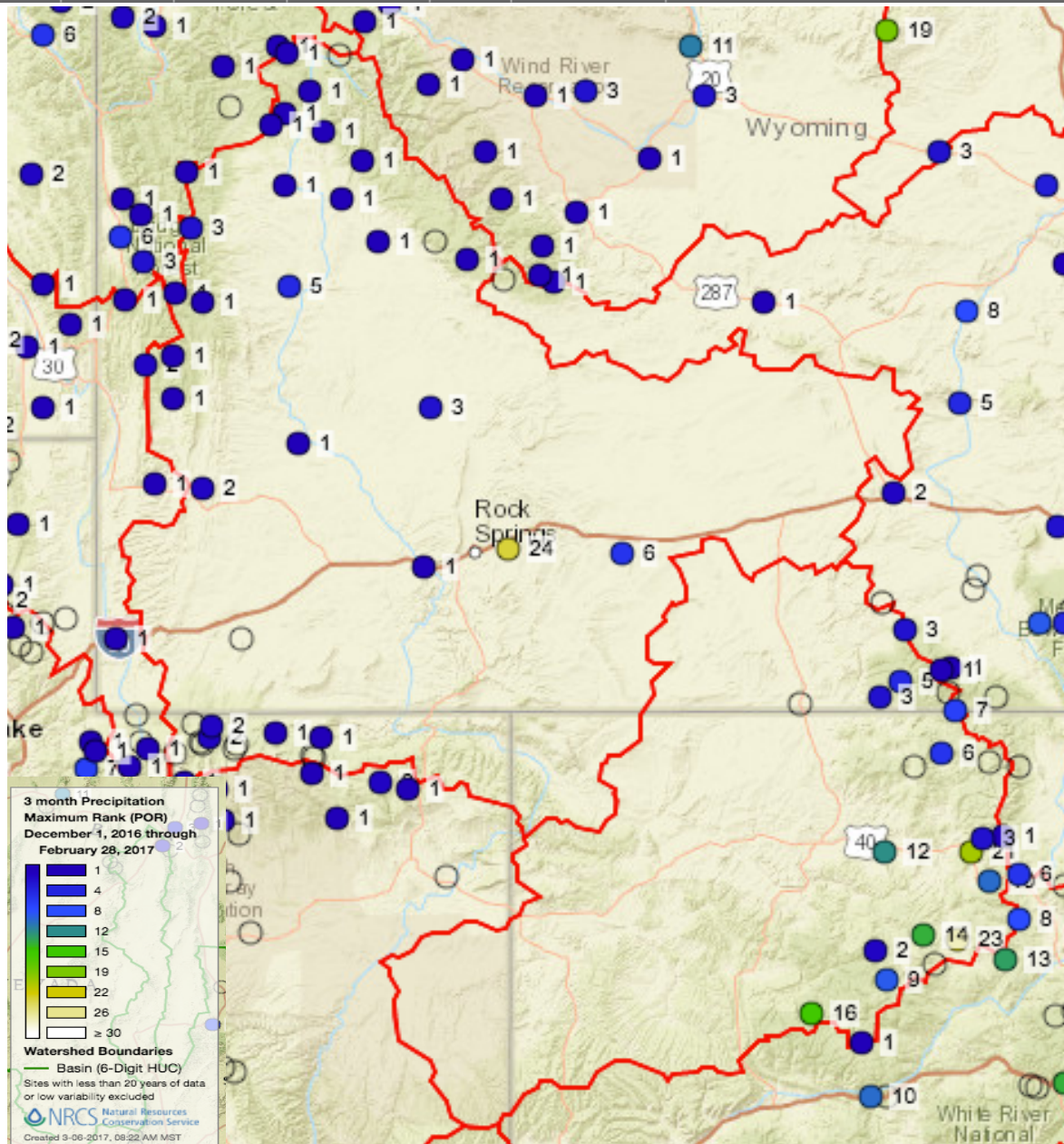


Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Monthly Precipitation - February 2017
(Averaged by Basin)



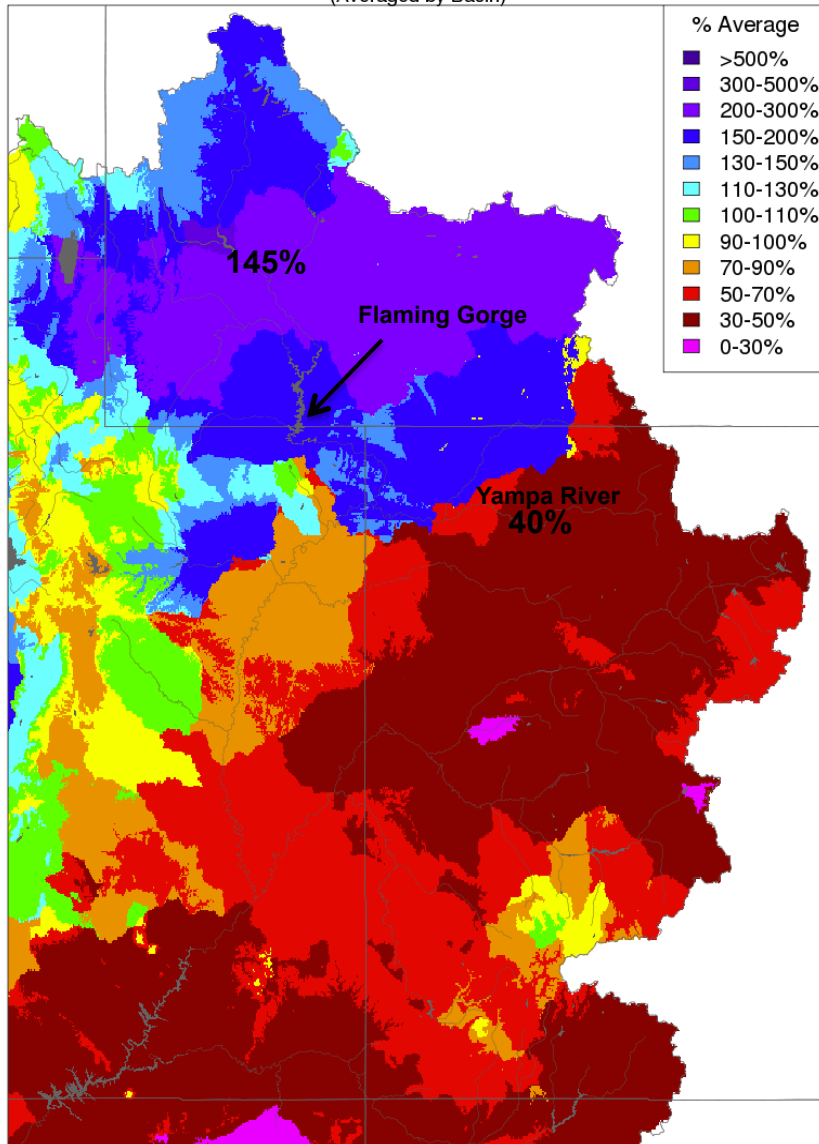
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov



Upper Green had record precipitation for the 3 month period of December-February

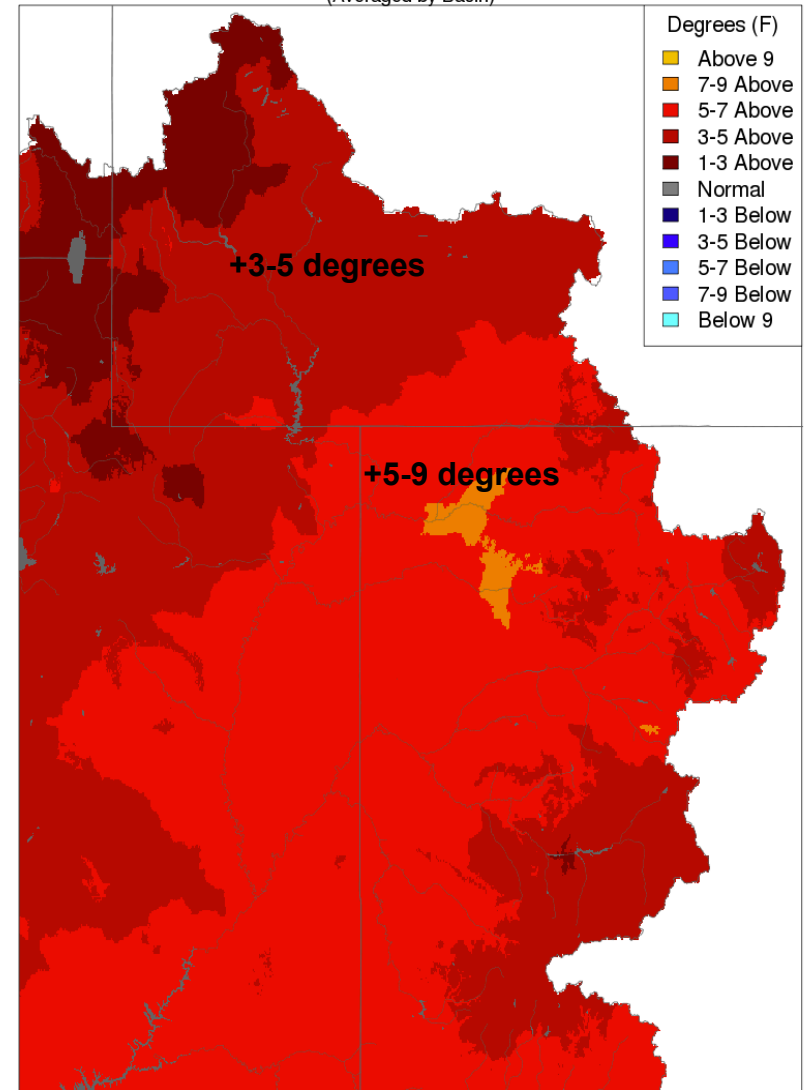
Weather Review: March Precipitation and Temperature

Monthly Precipitation - March 2017
(Averaged by Basin)



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

Max Temp - Monthly Deviation - March 2017
(Averaged by Basin)

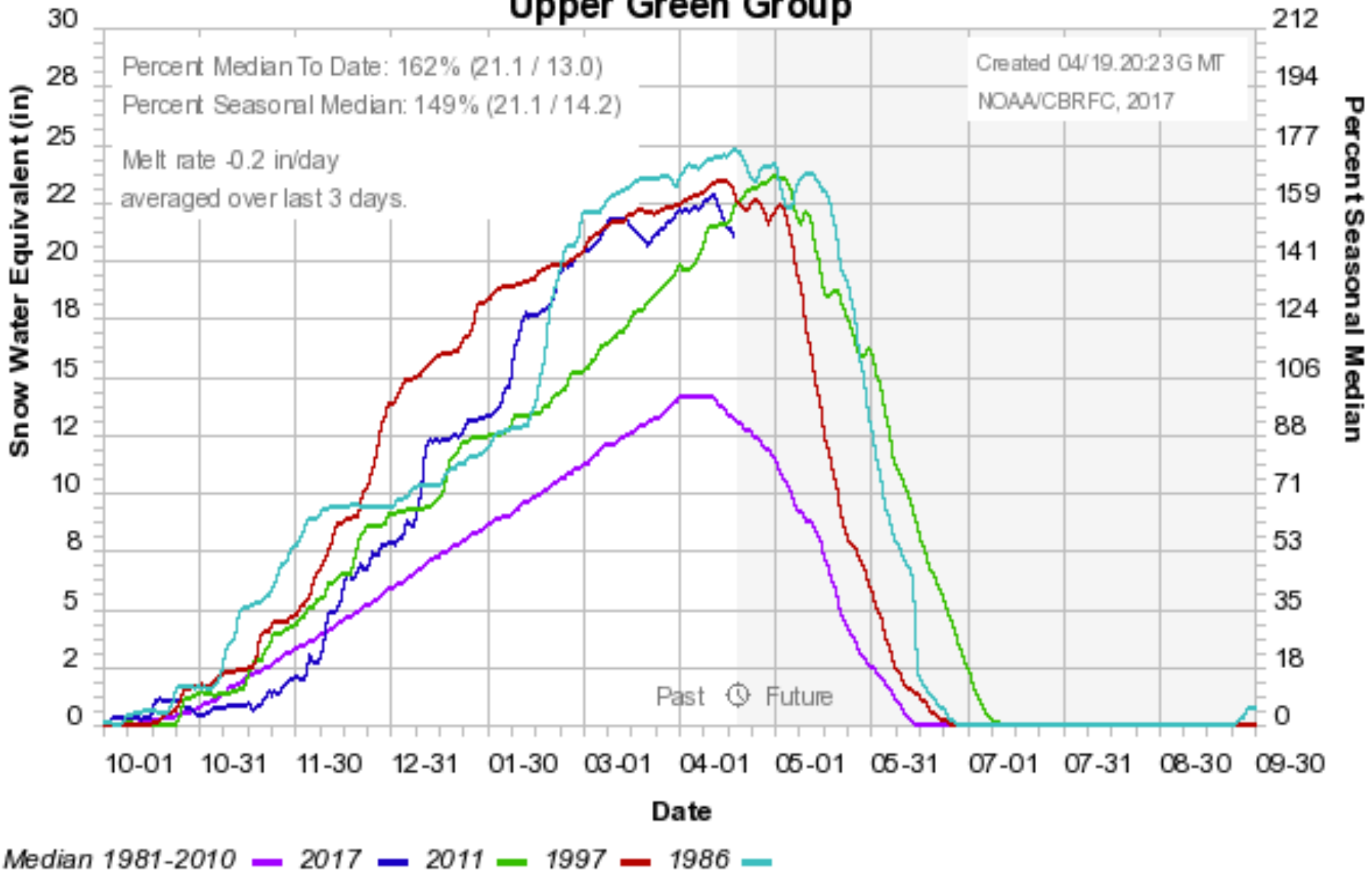


Daily temperatures reached 10-20 degrees above average

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

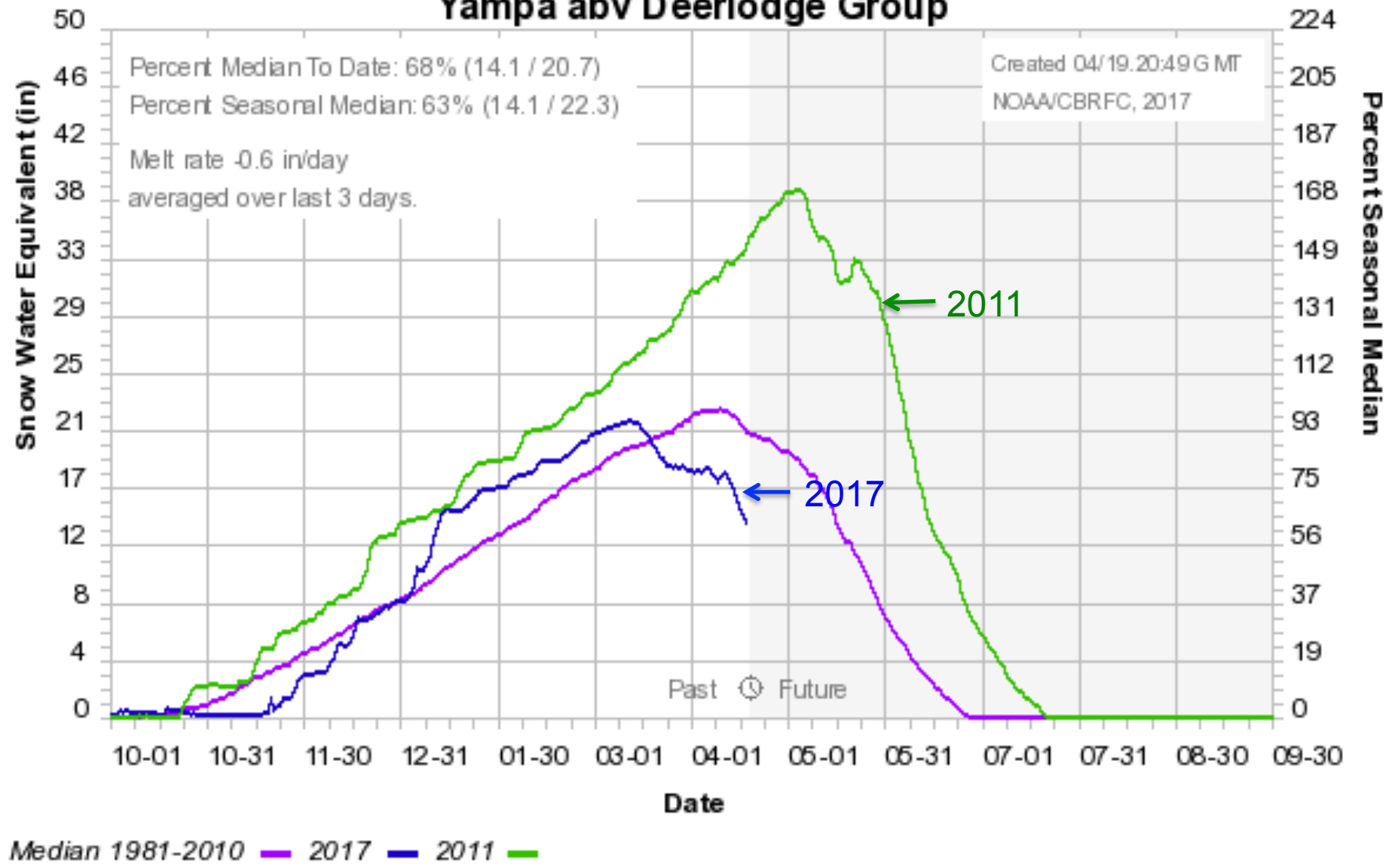
March Weather: Temperature Impacts to Snowpack

Colorado Basin River Forecast Center Upper Green Group



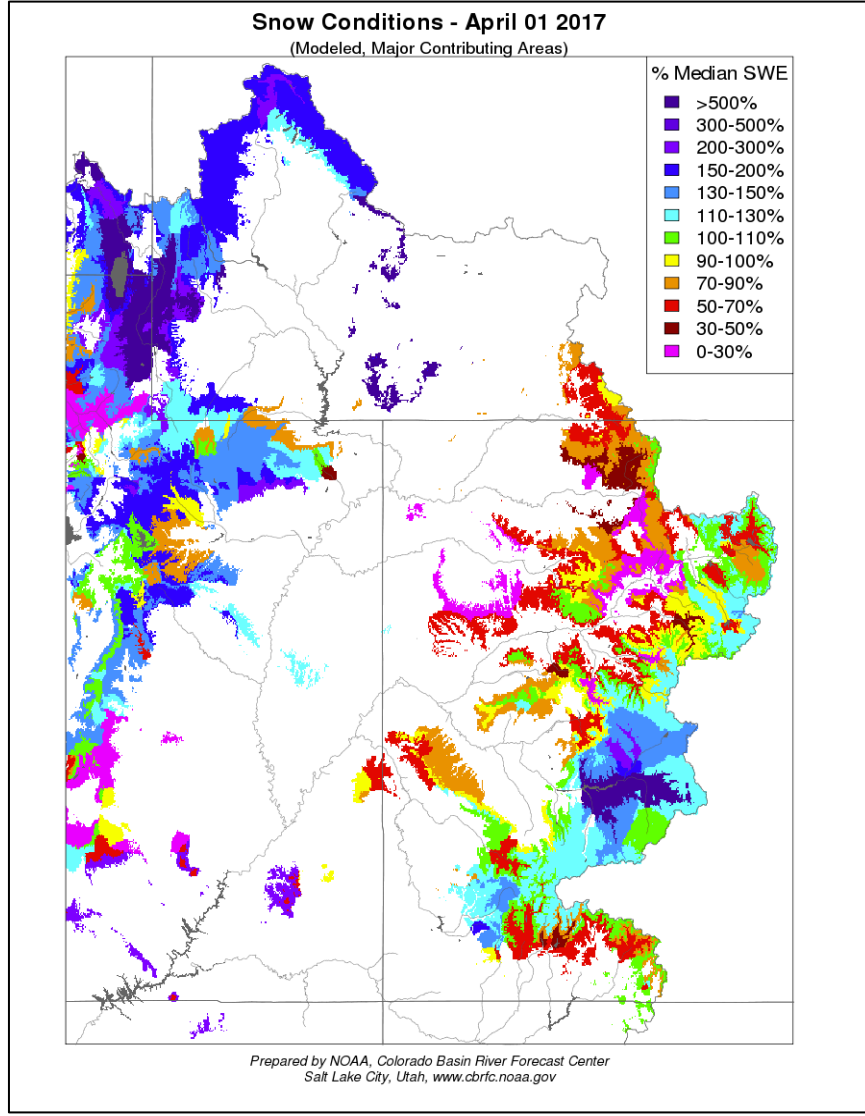
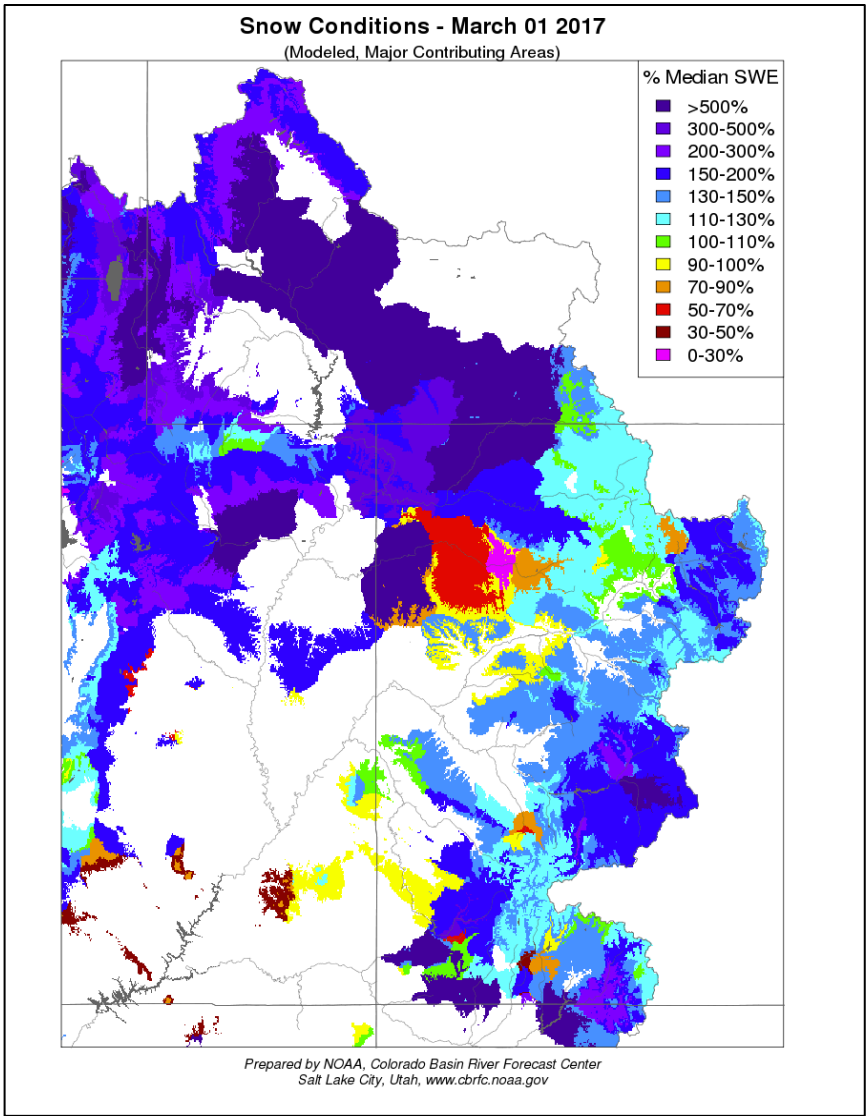
March Weather: Temperature Impacts to Snowpack

Colorado Basin River Forecast Center Yampa abv Deerlodge Group



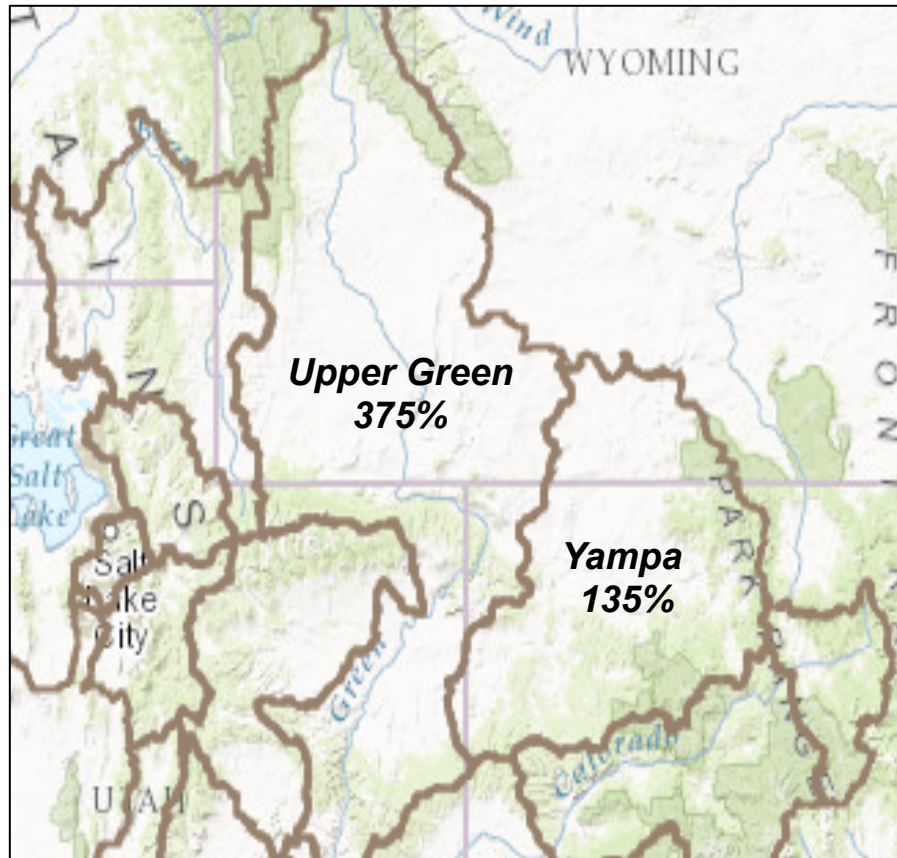
March Weather: Temperature Impacts to Snowpack

Upper Green: reduced low elevation (<8000 ft) snow; **significant snow remains at high elevations**
Yampa River: reduced significant low and mid elevation snow (~8500-10,000ft)



March Weather: Temperature Impacts to Streamflow

River Basin % Average Streamflow for March
(approximate)



Record March Runoff

Site (Rank/POR)	Mar Vol KAF / % Avg - old record (year)
Pine Creek (1/60)	2.5 / 240% 2.2 (1986)
Fontenelle (1/52)	180 / 343% 99 (1986)
Green River-WY (1/66)	237 / 413% 115 (1997)
Hams Fork (1/41)	3.2 / 240% 2.5 (2015)
Flaming Gorge (1/55)	400 / 392% 237 (1997)

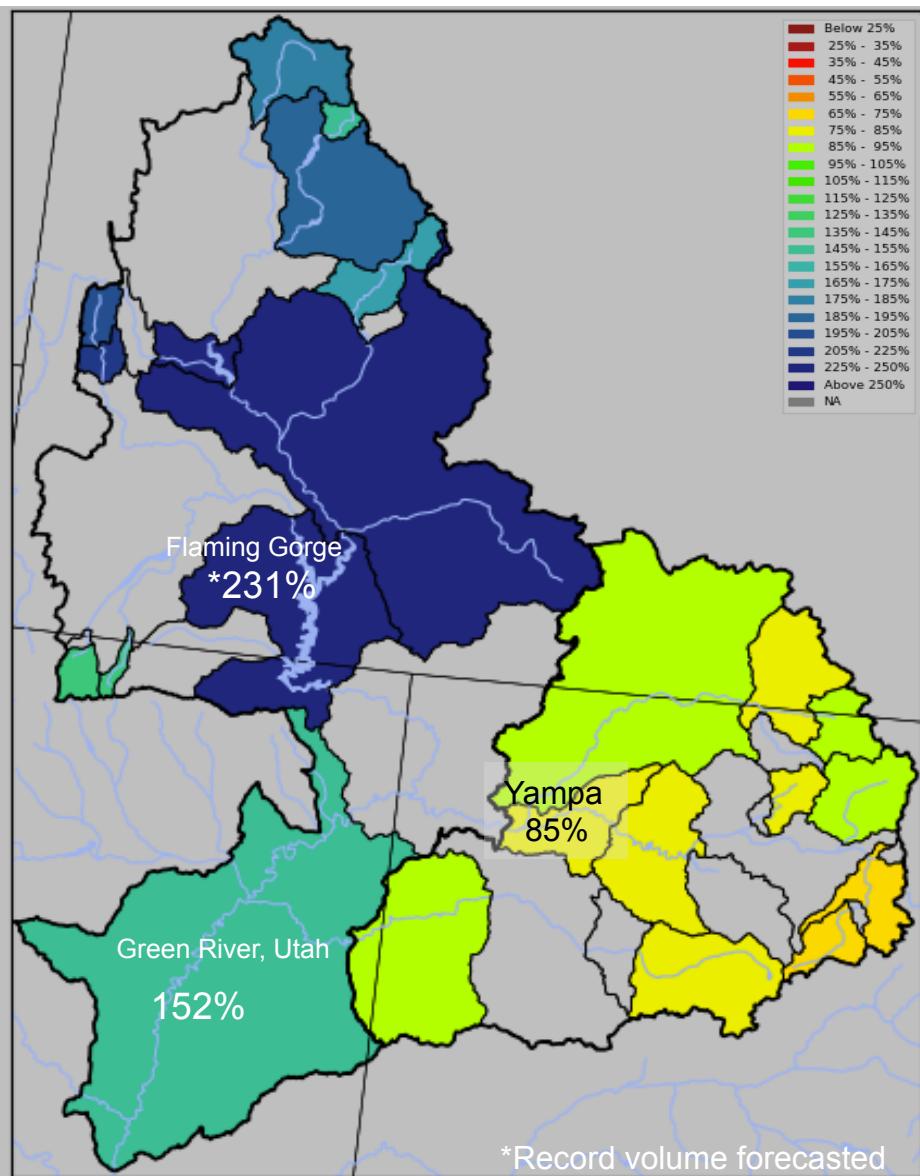
Many other sites in the top 2 or 3 in the Upper Green.

Data is provisional- not all basin stream flow sites are included

April 1st Water Supply Forecasts

Water Supply Forecasts: April – July Volumes

Most Probable Scenario (% of 1981-2010 average)



- CBRFC model makes assumptions about long range future weather
- Official forecasts provide a range of possible outcomes based on “dry”, “average”, and “wet” weather scenarios
- “Average” scenario is most commonly used forecast

April 1st Flaming Gorge Forecasts:

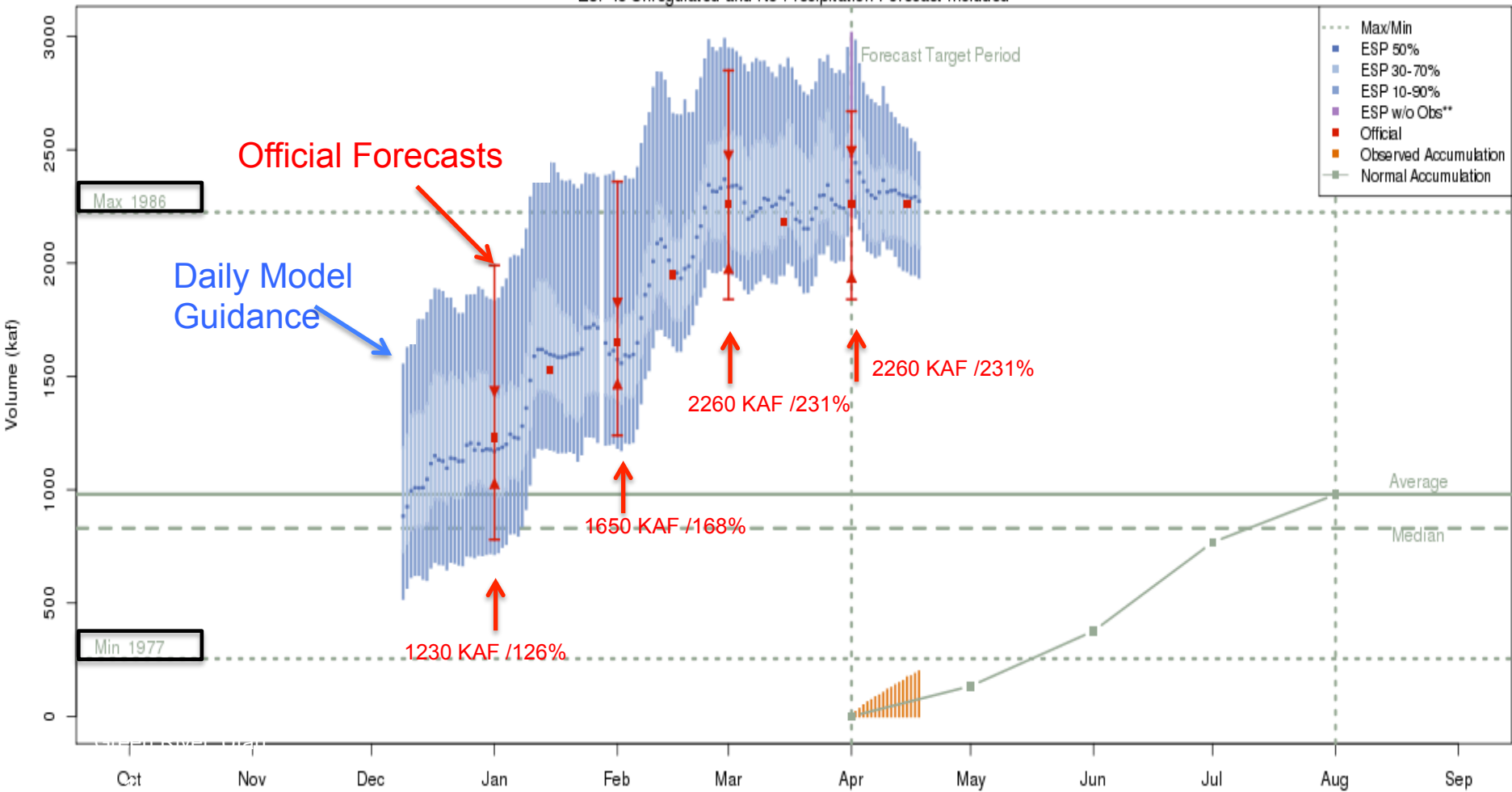
Dry	→	1840 KAF (187% average)
Average	→	2260 KAF (231% average)
Wet	→	2670 KAF (272% average)

April 1st Yampa River Forecasts:

Dry	→	765 KAF (62% average)
Average	→	1050 KAF (85% average)
Wet	→	1370 KAF (110% average)

Forecast Evolution Plot: Flaming Gorge Inflow

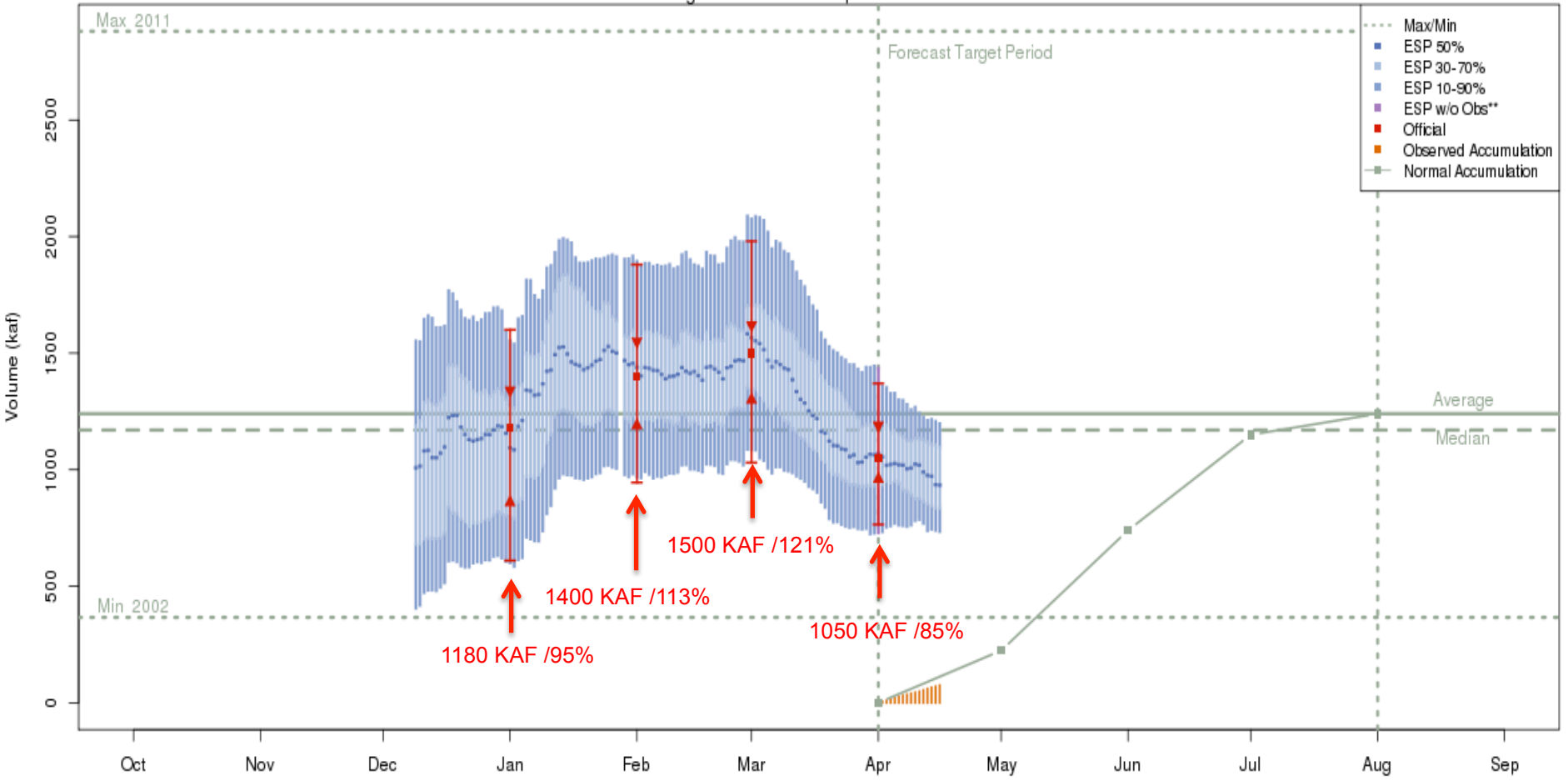
Green - Flaming Gorge Res- Flaming Gorge Dam- At (GRNU1)
 2017-04-15 Apr-Jul Official 50% Forecast: 2260 kaf (231% of average)
 ESP is Unregulated and No Precipitation Forecast Included



The most recent (2017-04-18) full period 50% ESP forecast is 2273 kaf.
 Plot Created 2017-04-18 15:15:34, NOAA / NWS / CBRFC
 Forecasts in the forecast target period include observed values.

Forecast Evolution Plot: Yampa River-Deerlodge

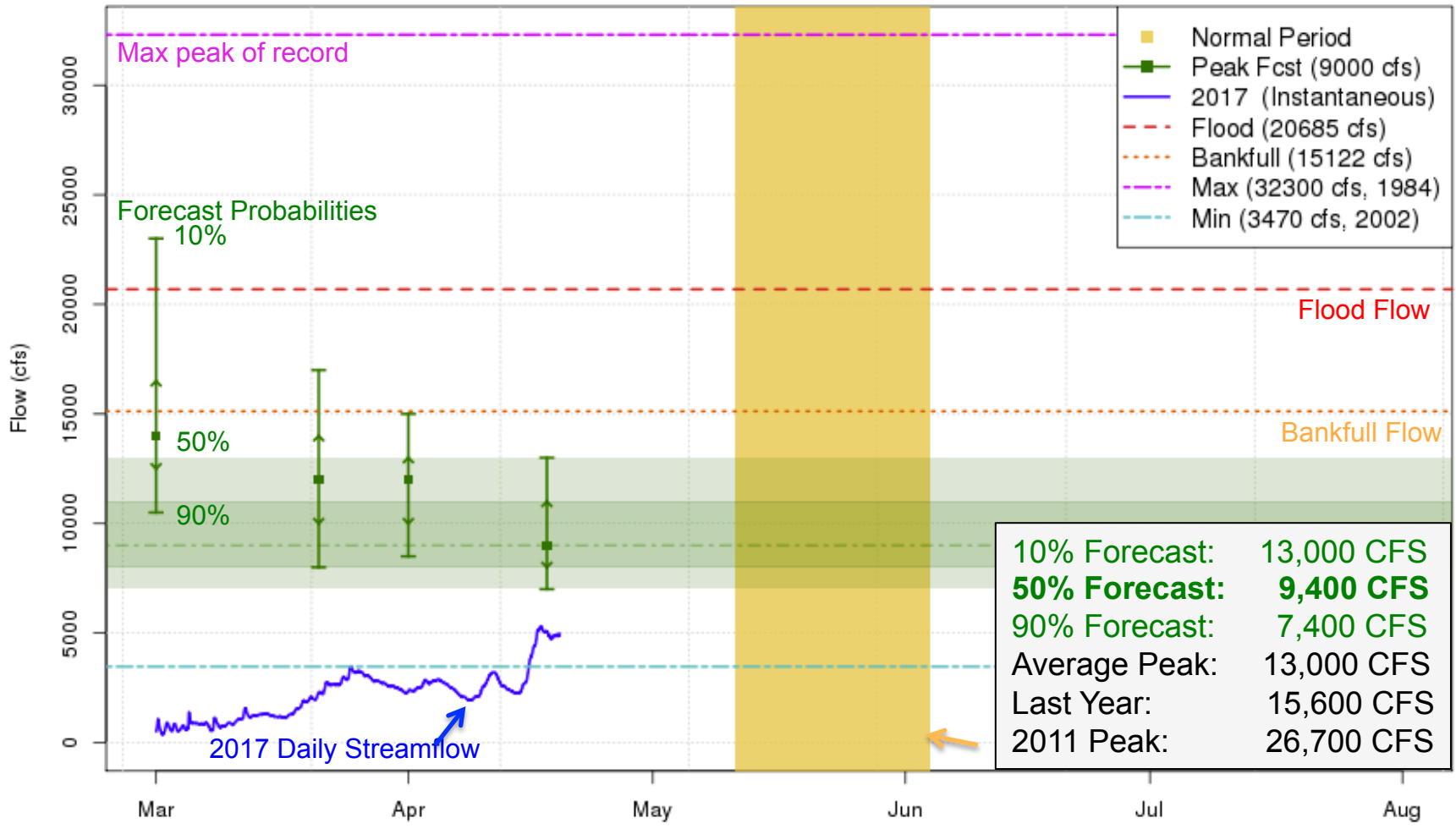
Yampa - Deerlodge Park (YDLC2)
2017-04-01 Apr-Jul Official 50% Forecast: 1050 kaf (85% of average)
 ESP is Unregulated and No Precipitation Forecast Included



The most recent (2017-04-16) full period 50% ESP forecast is 934 kaf.
 Plot Created 2017-04-16 11:48:27, NOAA / NWS / CBRFC
 Forecasts in the forecast target period include observed values.

Peak Flow Outlook: Yampa River-Deerlodge

2017 Mean Daily Peak Flow Forecast
Yampa - Deerlodge Park (YDLC2)

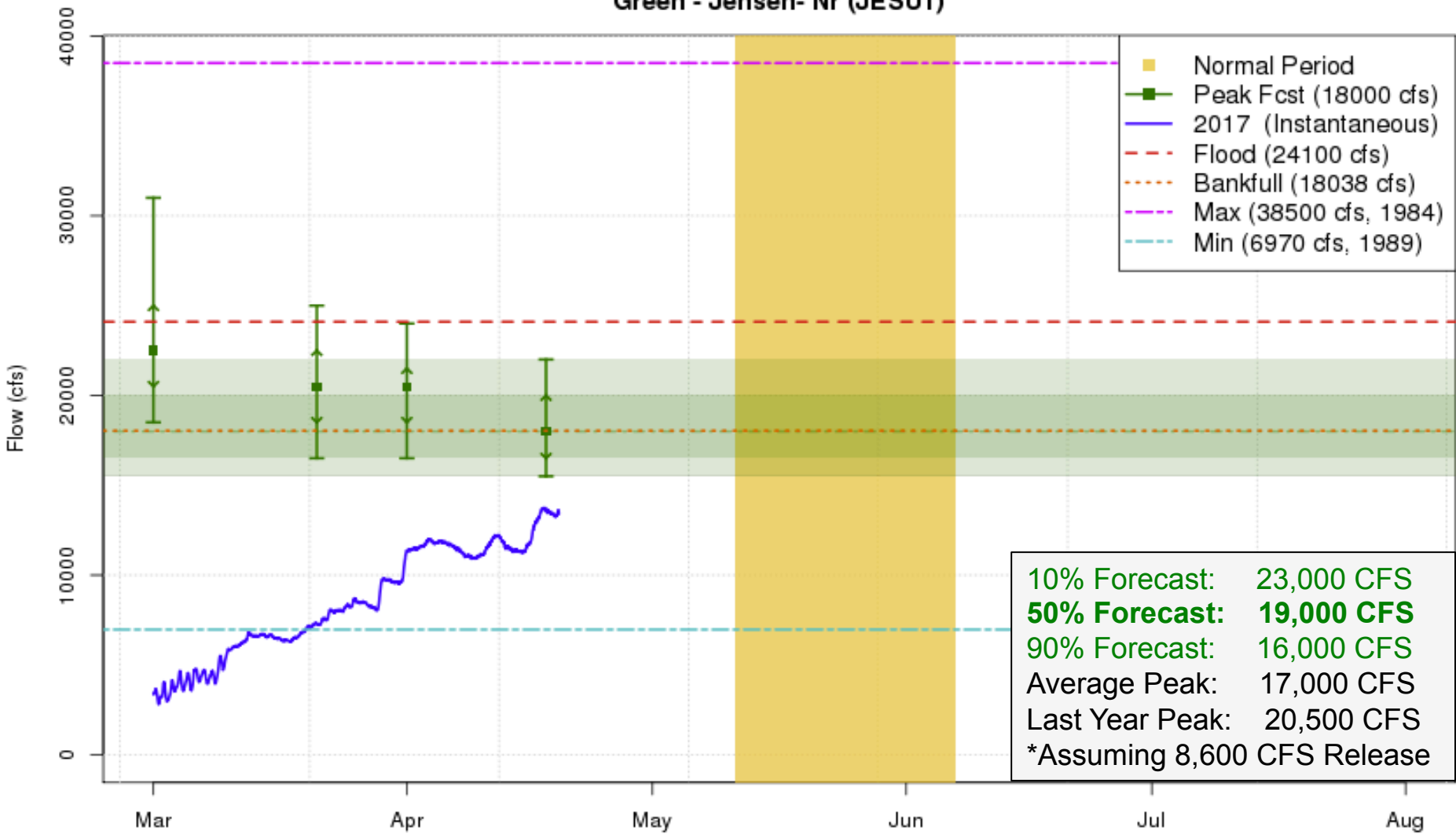


These graphics are updated approximately every two weeks between 3/1 and 5/1

Plot Created 2017-04-19 08:58:32
CBRFC / NWS / NOAA

Peak Flow Outlook: Green River- Jensen

2017 Mean Daily Peak Flow Forecast
Green - Jensen- Nr (JESU1)

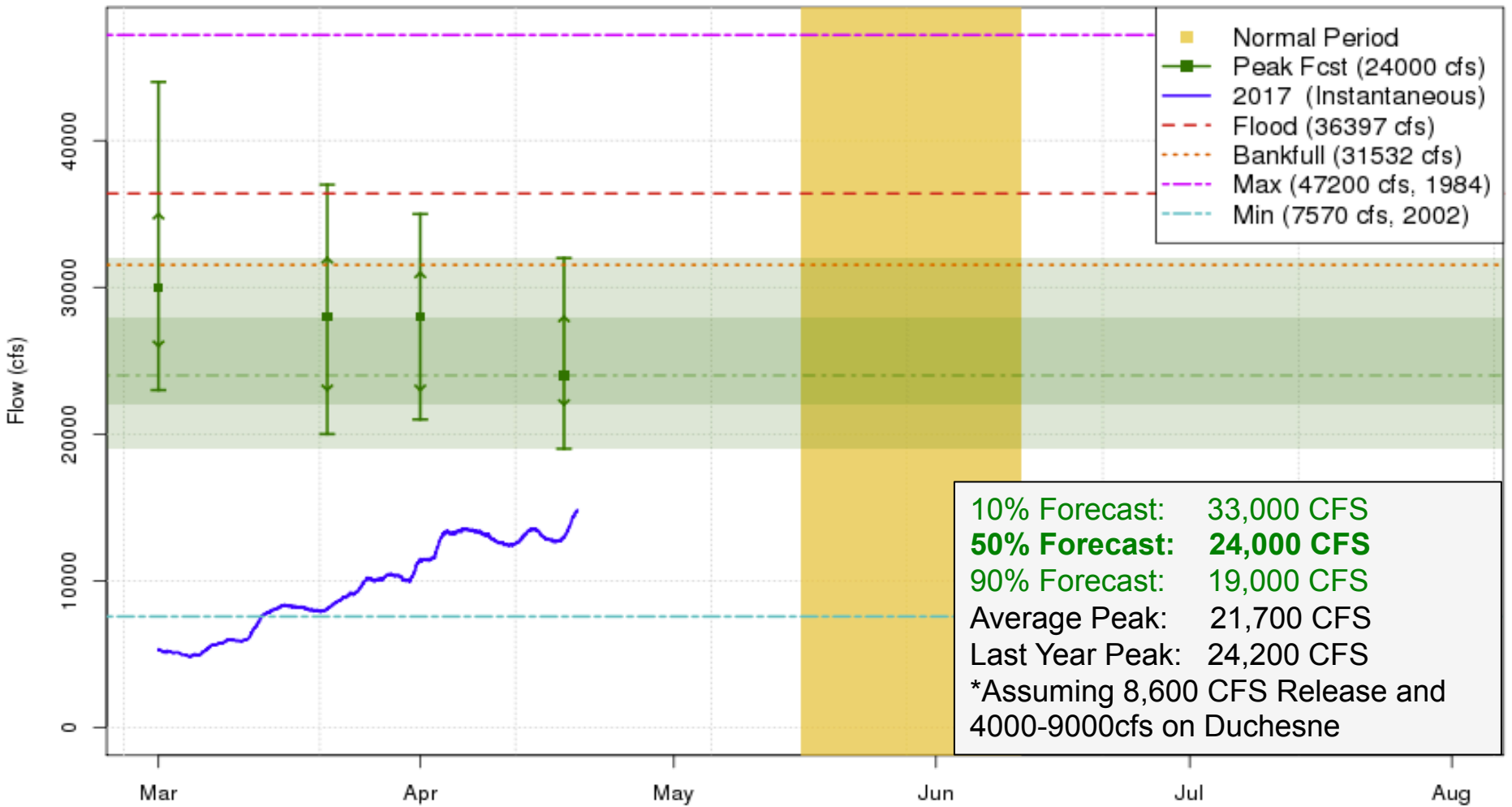


These graphics are updated approximately every two weeks between 3/1 and 5/1

Plot Created 2017-04-19 08:57:38
CBRFC / NWS / NOAA

Peak Flow Outlook: Green River, Utah

2017 Mean Daily Peak Flow Forecast
Green - Green River- Ut (GRVU1)

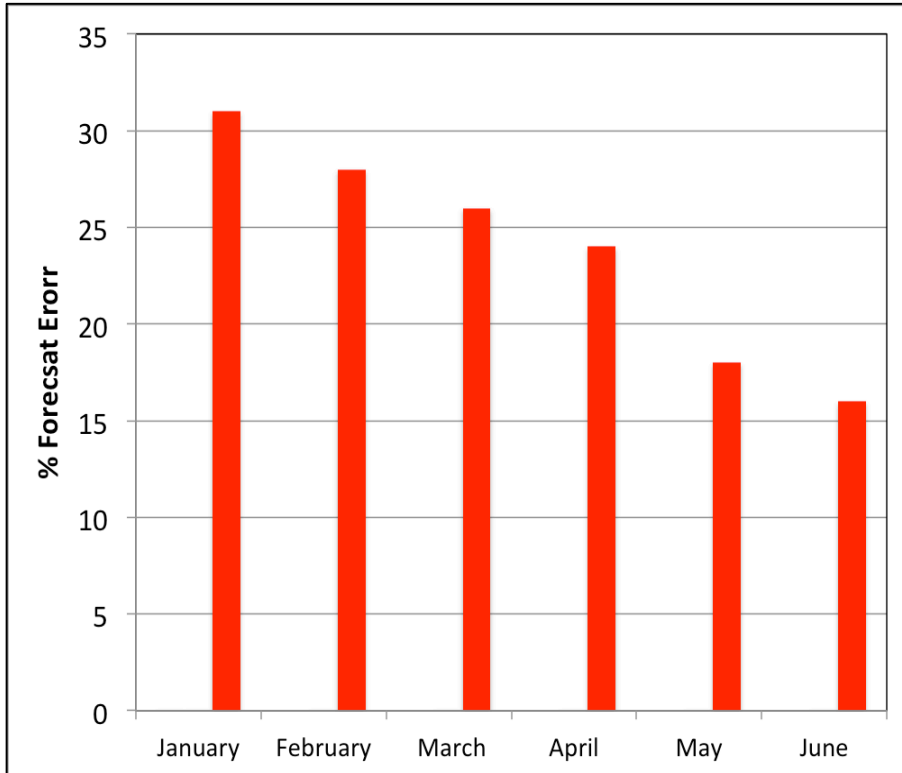


10% Forecast: 33,000 CFS
50% Forecast: 24,000 CFS
 90% Forecast: 19,000 CFS
 Average Peak: 21,700 CFS
 Last Year Peak: 24,200 CFS
 *Assuming 8,600 CFS Release and 4000-9000cfs on Duchesne

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

How good are the April-July volume forecasts?

Flaming Gorge Average Historical Model Error
50% Exceedance Forecast (1981-2010)



- Higher forecast error early in the season
- Error decreases through out the season
- **Error may be higher in wet years**

January 1st Forecast:

What we know:

- ~40% of snowpack accumulation
- Fall soil moisture conditions

What we **DON'T** know:

- Feb-May weather (4 months)
- ~60% of snowpack accumulation

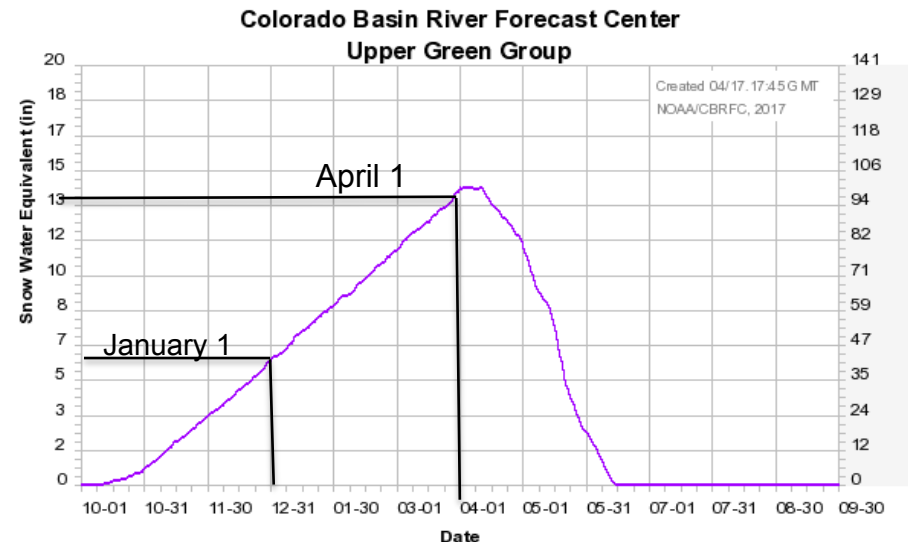
April 1st Forecast:

What we **KNOW**:

- ~98% of snowpack accumulation
- Dec-March weather

What we don't know:

- April-May weather (2 months)
- Snowmelt pattern



What are the sources of uncertainty in the forecasts?

Future Weather

- Uncertainty in temperature and precipitation forecasts
- Extreme events (record wet/record dry) are rarely forecast
- Snowmelt pattern

Model Snow States

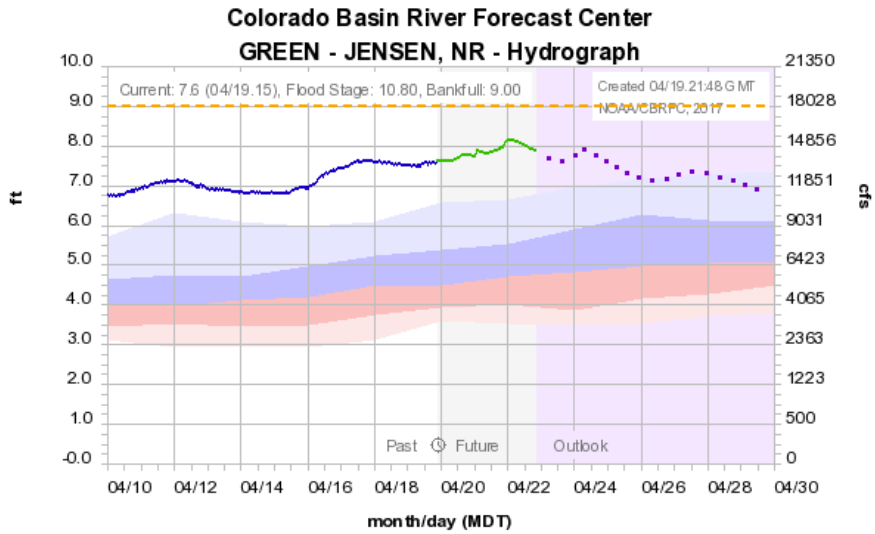
- Is the model's representation (amount and extent) of the snowpack correct?
- SNOTELS and satellite images used to verify model snow states
- SNOTELS become less representative during melt

Model Soil Moisture States

- Current conditions are near the model max
- Near the upper end of the model calibration; more uncertainty than an average year

Contact Us!

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 - michelle.stokes@noaa.gov
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 - ashley.nielson@noaa.gov
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 NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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News Colorado River Basin Water Supply Briefing - April 7th 11 am MDT - Register here: [Read More...](#)
 Great Basin Basin Water Supply Briefing - April 7th 1 pm MDT - Register here: [Read More...](#)

Conditions Map Help

River Conditions
 Data Updated: 03/21/2022 Help

Show Hide Other Types
 Data
 Forecast
 Reservoir Inflow
 Reservoir Outflow
 Official Flood
 Active

● Not Available
● Normal
● Significant Rise
● Near Bankfull
● Above Bankfull
● Above Flood Stage
● Outlook (> 3 days)

Pop-up Alerts

Snow Conditions
Water Supply Forecasts
Peak Flood Probability
Reservoir Conditions
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Questions?

