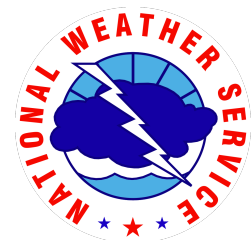


# Green and Yampa Rivers: Current Conditions and Forecasts

April 19<sup>th</sup>, 2016

Flaming Gorge Working Group Meeting

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



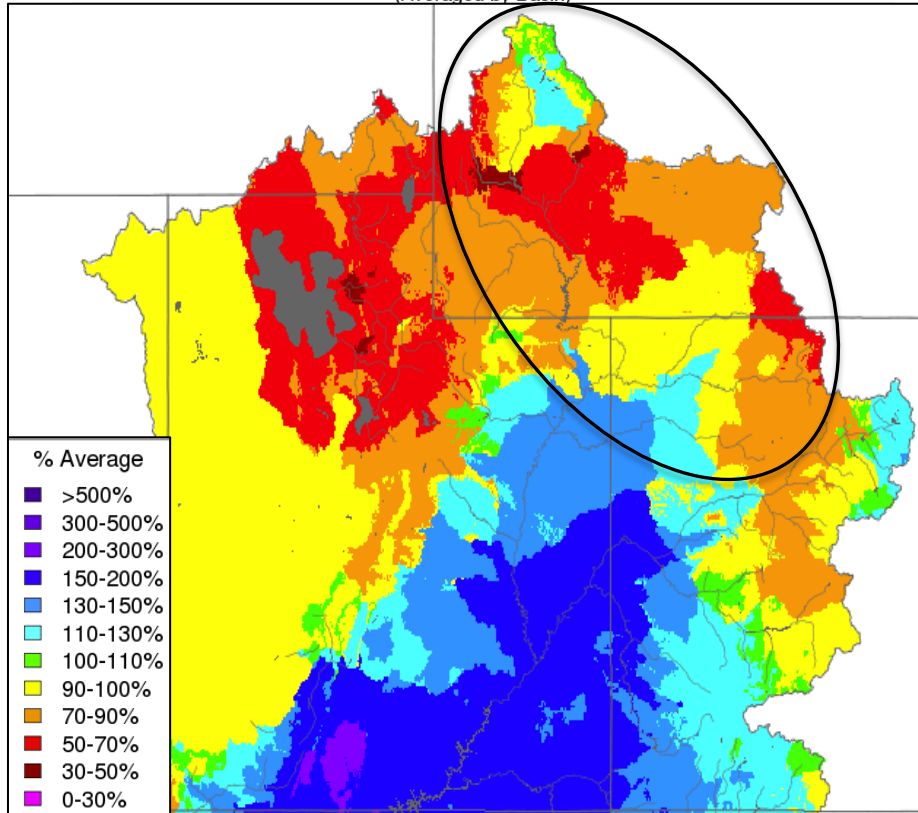
# Today's Presentation

- Weather Review (Fall + Winter)
- Current Conditions Impacting Forecasts
  - Soil Moisture (modeled)
  - Snow
- Forecasts
  - April-July Water Supply Volumes
  - Peak Flows
- Weather Outlooks
- National Weather Service Critical Levels

# Weather Review: Fall Precipitation/Temperatures

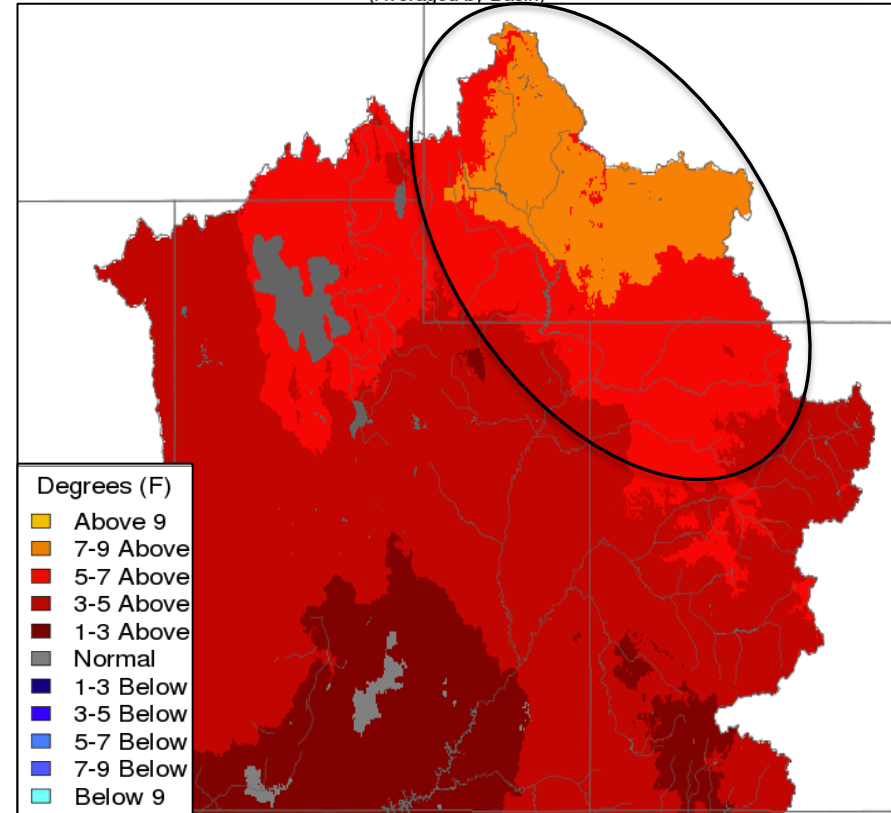
Water Year Precipitation, October 2014 - November 2015

(Averaged by Basin)



Max Temp - Monthly Deviation - October 2015

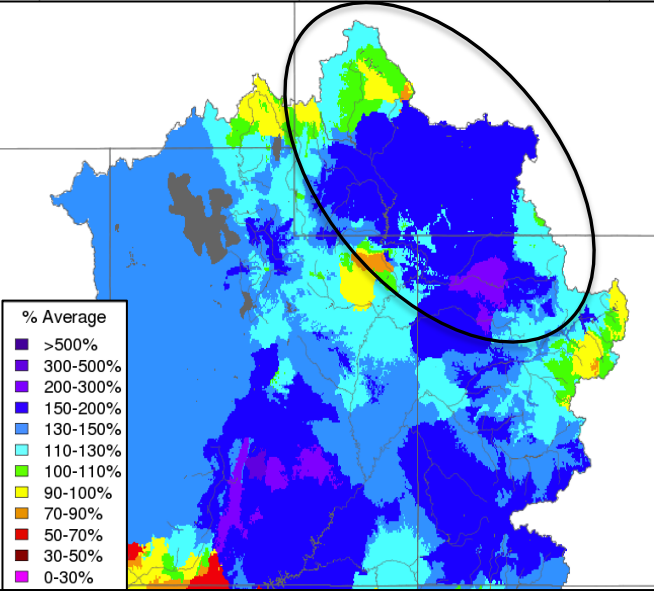
(Averaged by Basin)



Warm October resulted in rain rather than snow at high elevations

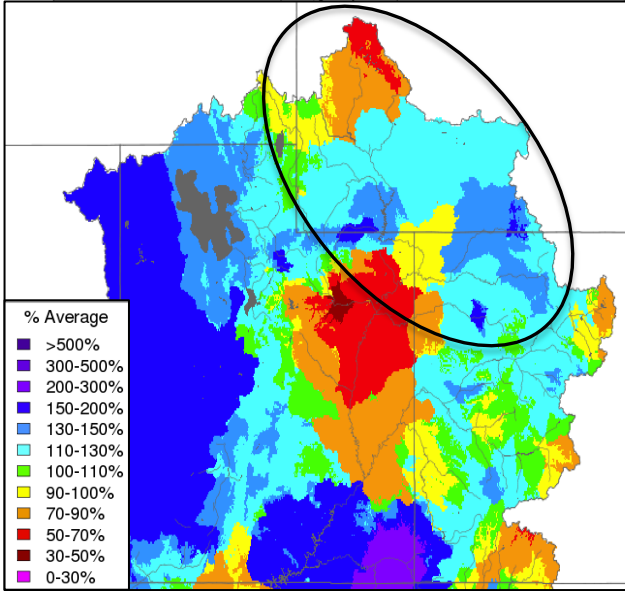
# Weather Review: Winter Precipitation

Monthly Precipitation - December 2015  
(Averaged by Basin)



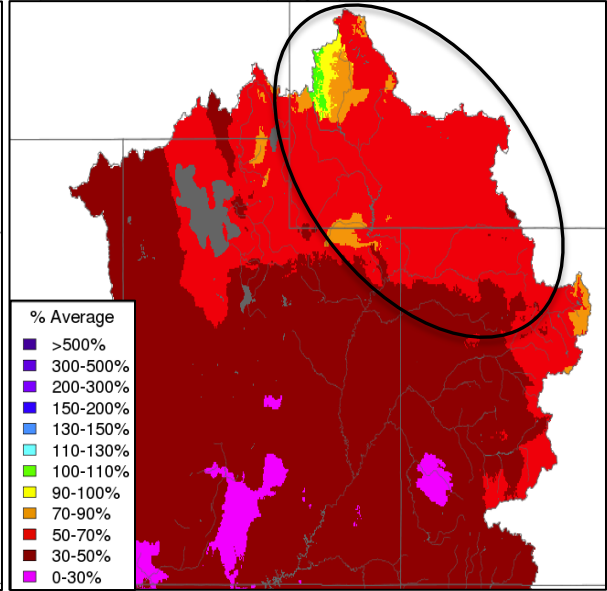
Above Flaming Gorge: 115%  
Yampa River: 125%

Monthly Precipitation - January 2016  
(Averaged by Basin)



Above Flaming Gorge: 93%  
Yampa River: 125%

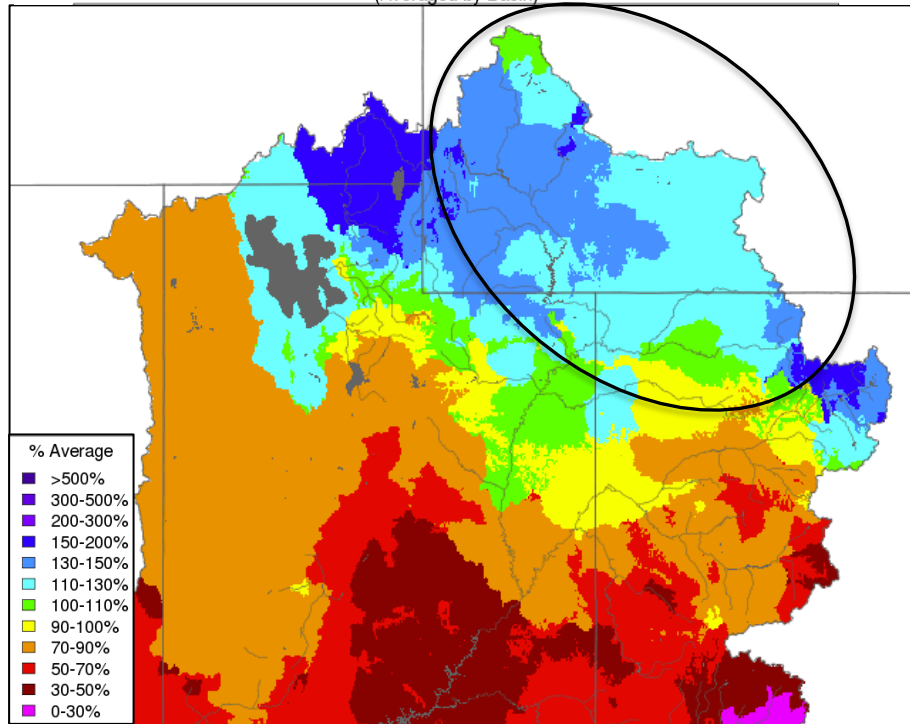
Monthly Precipitation - February 2016  
(Averaged by Basin)



Above Flaming Gorge: 65%  
Yampa River: 55%

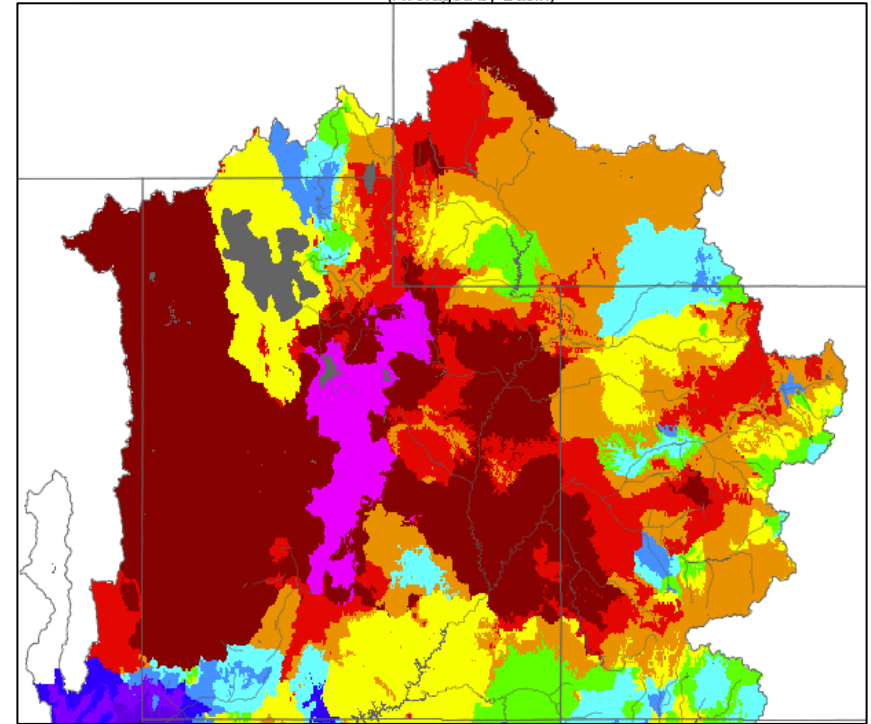
# Weather Review: Spring Precipitation

Monthly Precipitation - March 2016  
(Averaged by Basin)



Above Flaming Gorge: 135%  
Yampa River: 130%

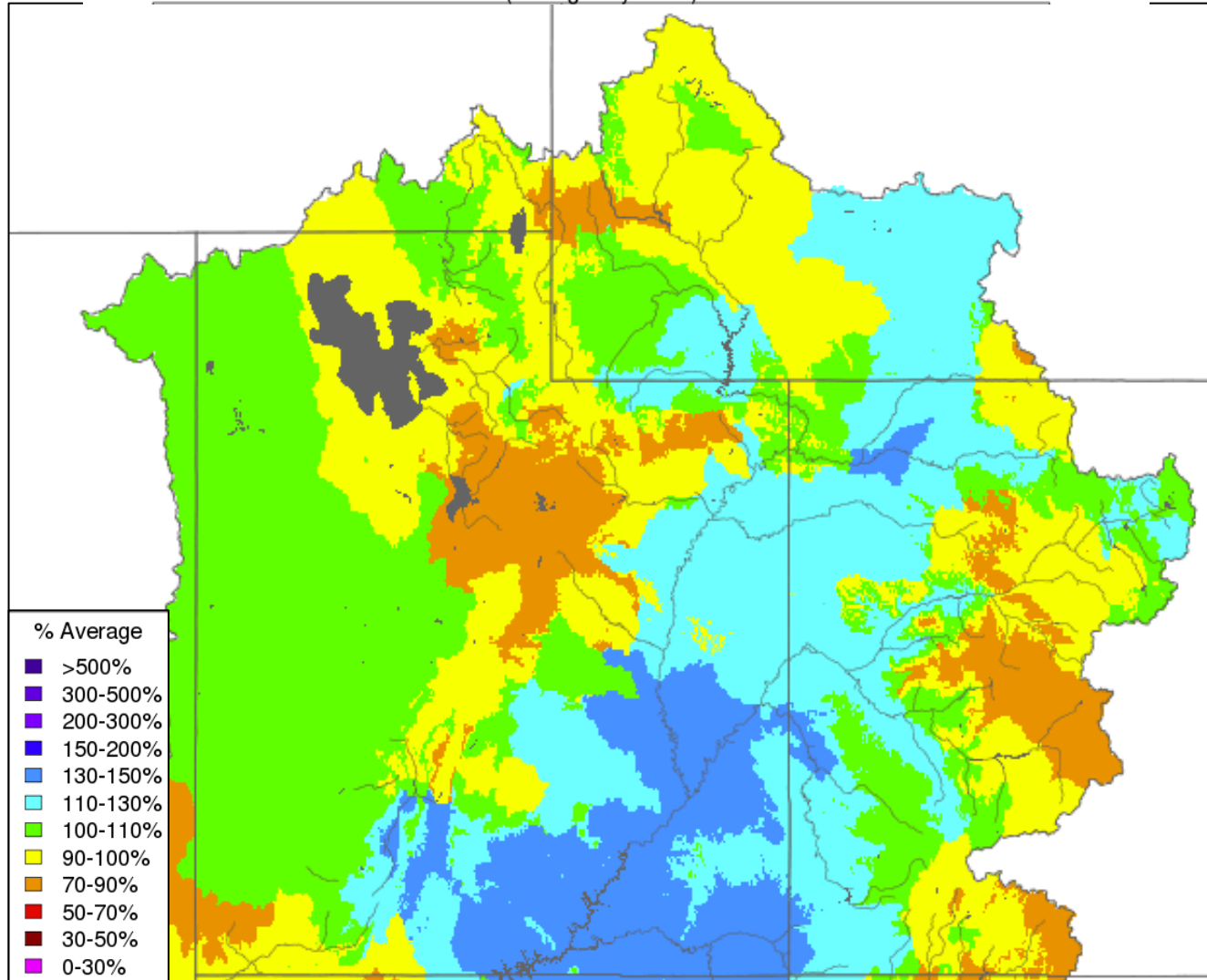
Month to Date Precipitation - April 18 2016  
(Averaged by Basin)



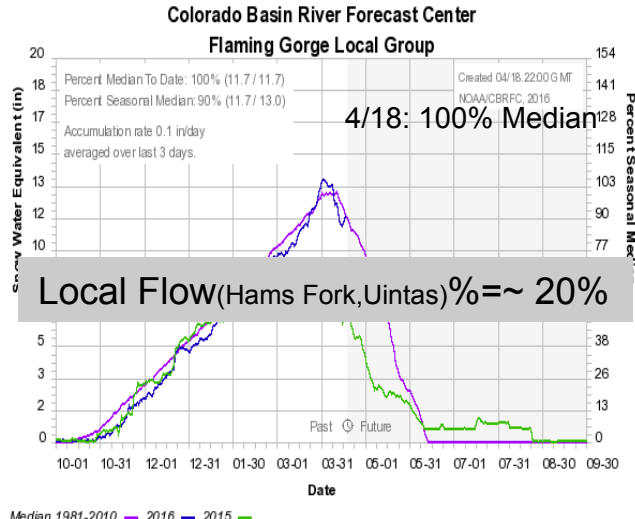
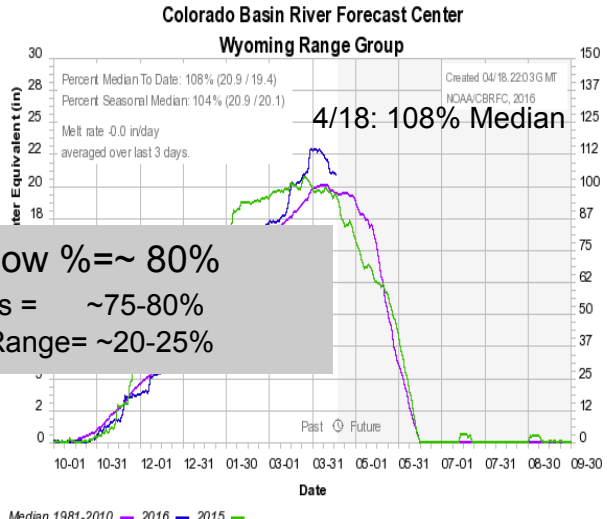
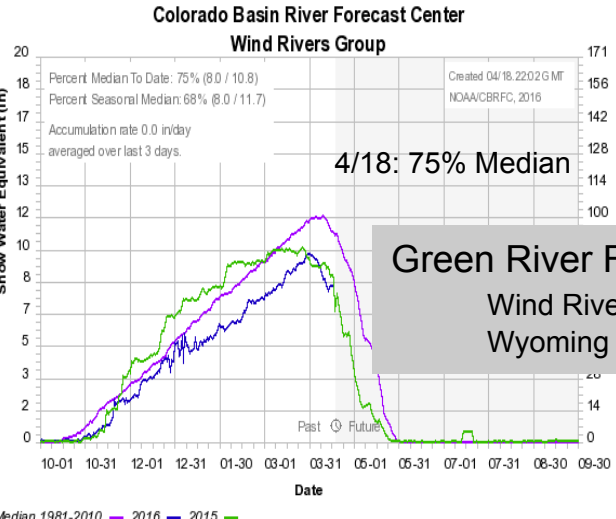
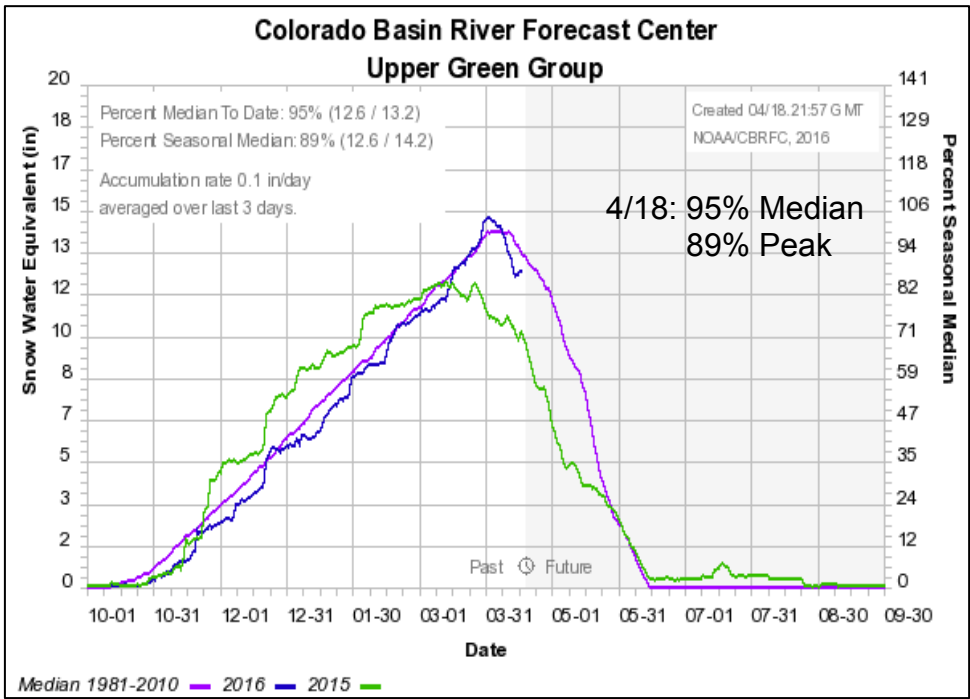
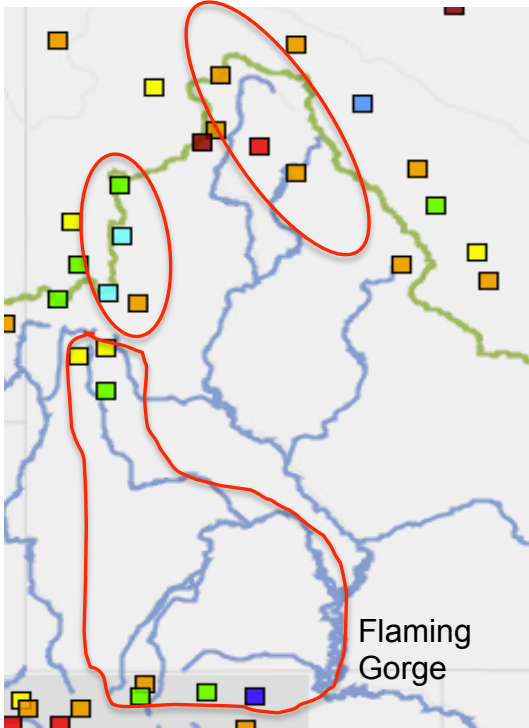
# Weather Review: Water Year Precipitation

Water Year Precipitation, October 2015 - March 2016

(Averaged by Basin)



# Snow (Upper Green SNOTELS)

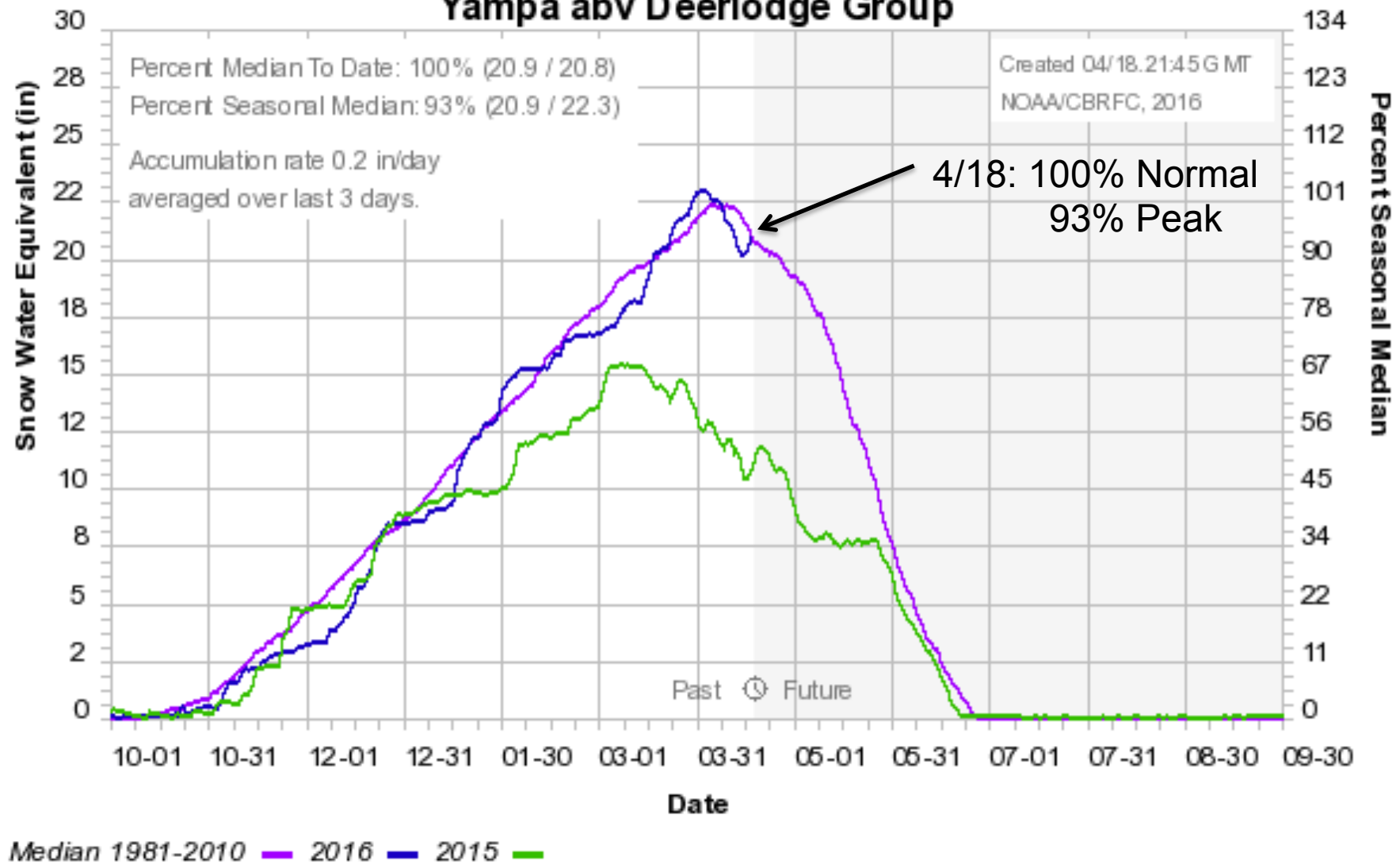


**Green River Flow % = ~ 80%**  
Wind Rivers = ~75-80%  
Wyoming Range = ~20-25%

**Local Flow (Hams Fork, Uintas) % = ~ 20%**

# Snow (Yampa River SNOTELS)

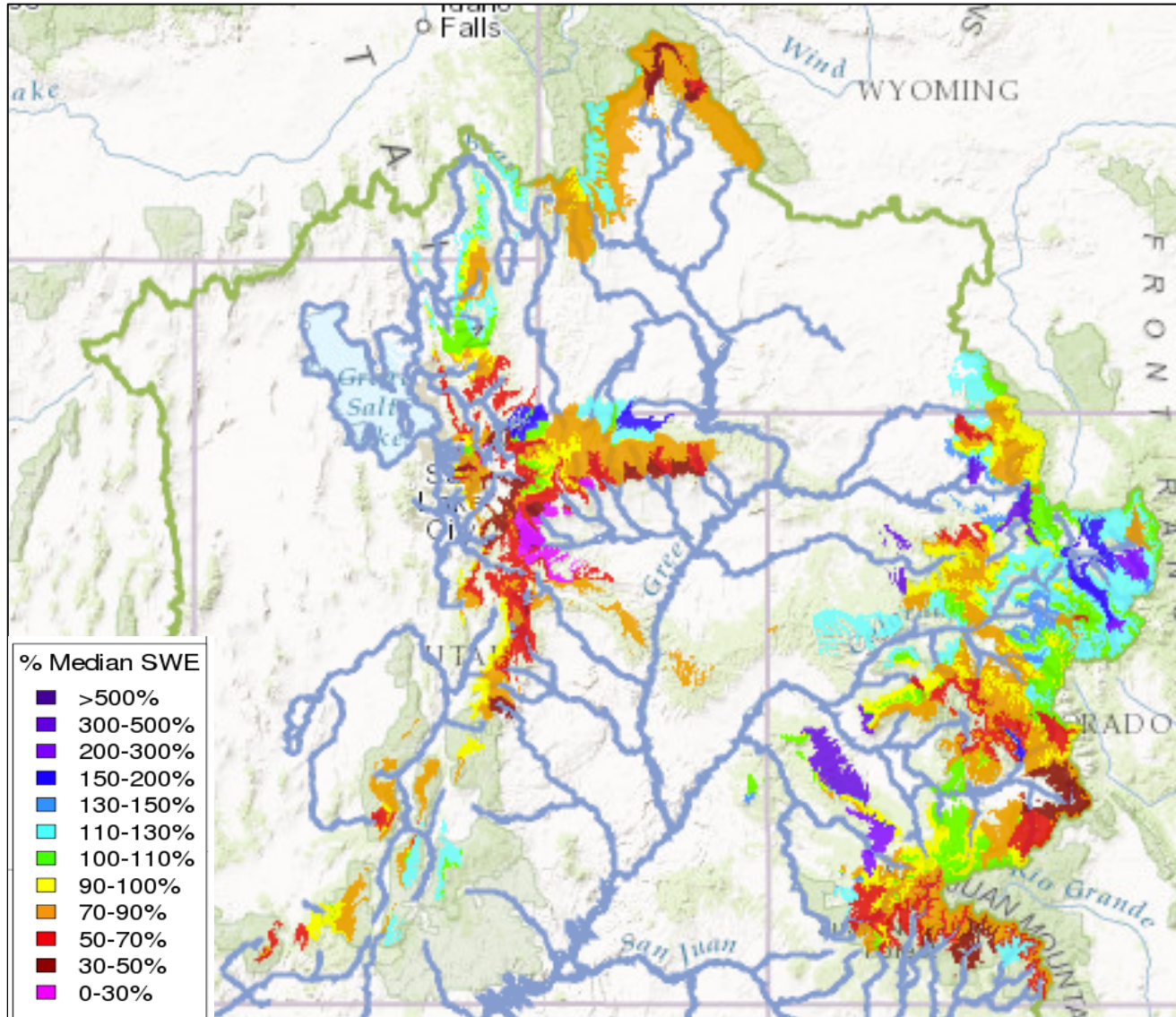
## Colorado Basin River Forecast Center Yampa abv Deerlodge Group





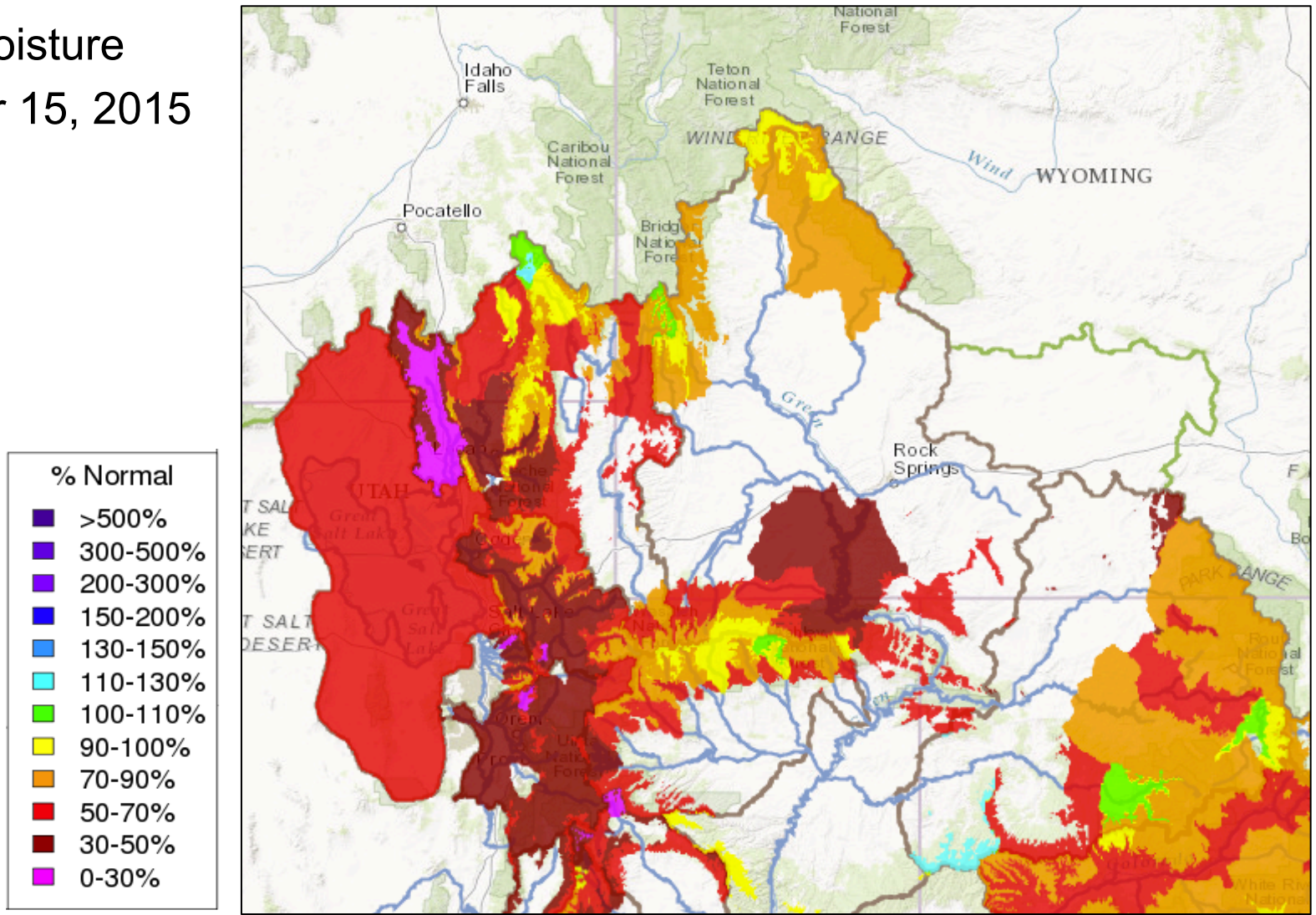
# Snow (CBRFC Hydrologic Model)

April 18<sup>th</sup> 2016  
Significant Runoff Areas



# Fall Soil Moisture

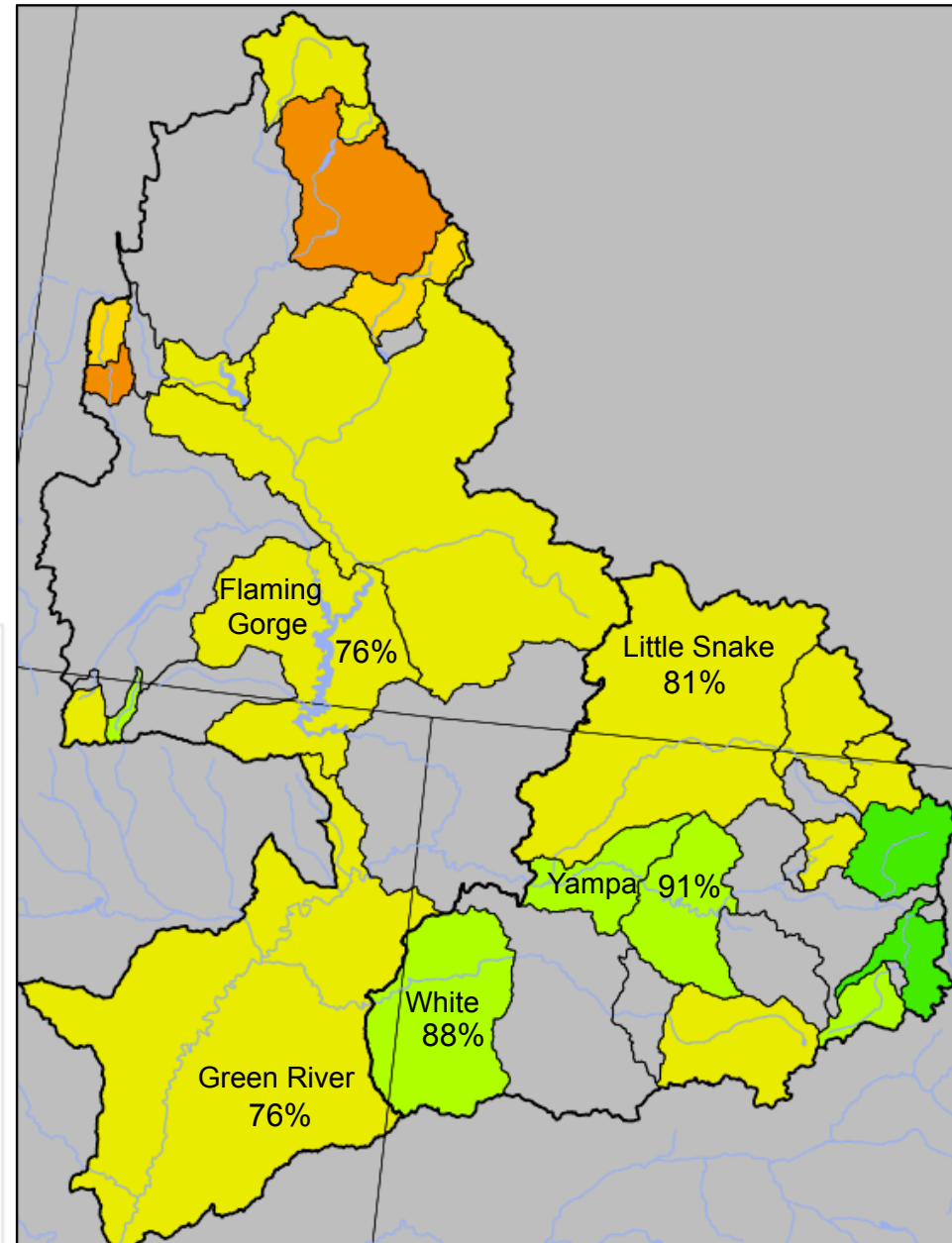
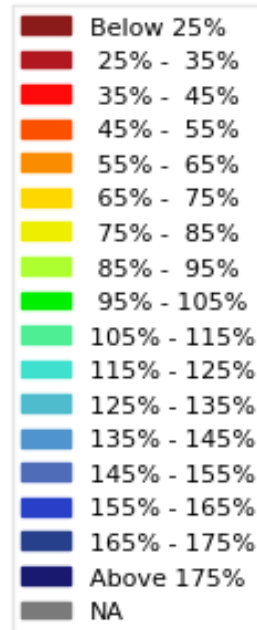
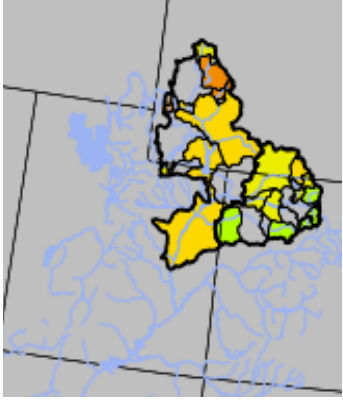
Soil Moisture  
November 15, 2015



Soil Moisture representation from the CBRFC hydrologic model

# April 1<sup>st</sup> Water Supply Forecasts

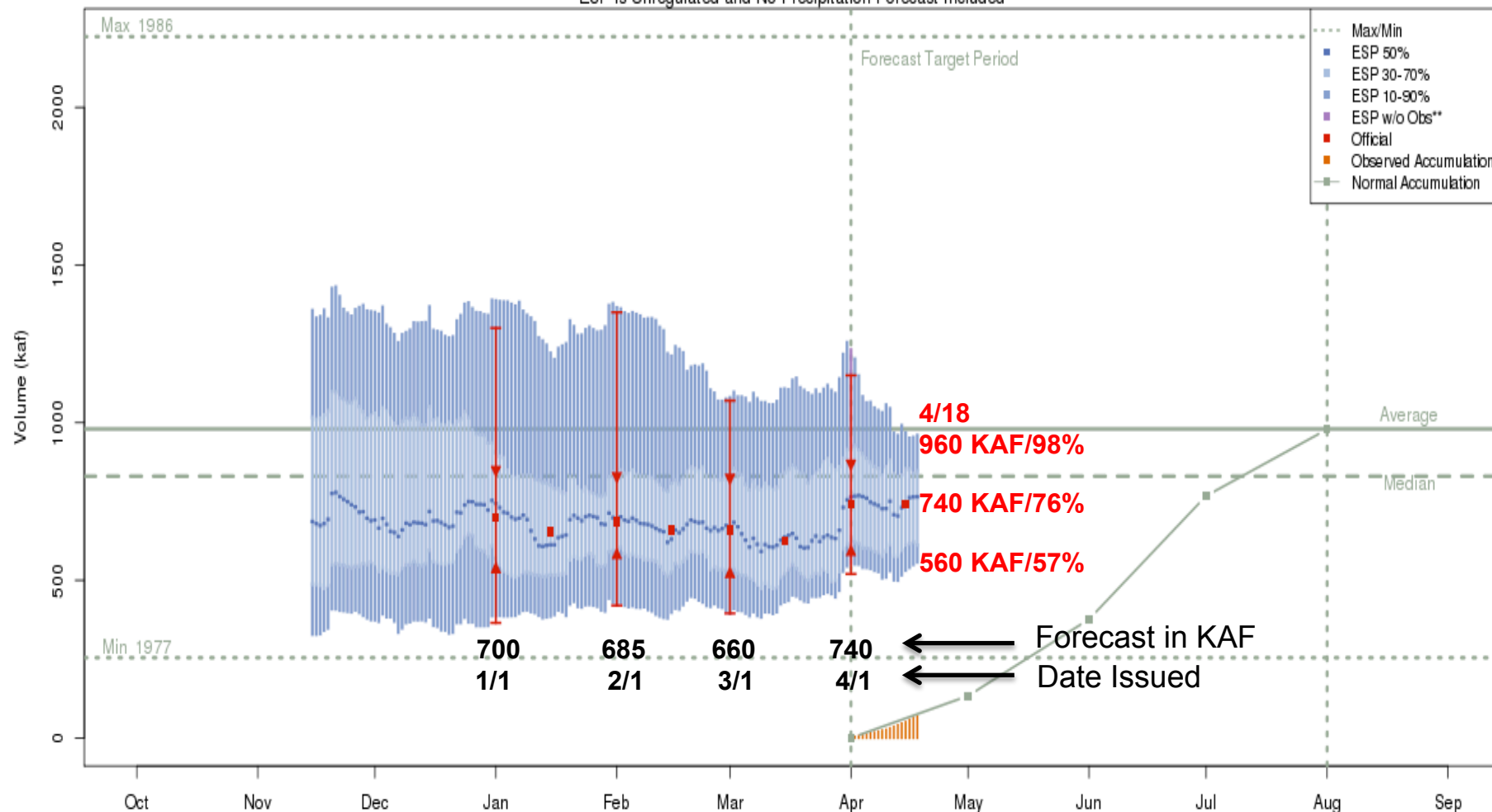
Upper Green and Yampa River Basins  
April-July Forecast Streamflow Volumes  
(% of 1981-2010 average)



# Forecast: Flaming Gorge Inflow

## Seasonal Forecast Progression

Green - Flaming Gorge Res- Flaming Gorge Dam- At (GRNU1)  
2016-04-15 Apr-Jul Official 50% Forecast: 740 kaf (76% of average)  
ESP is Unregulated and No Precipitation Forecast Included

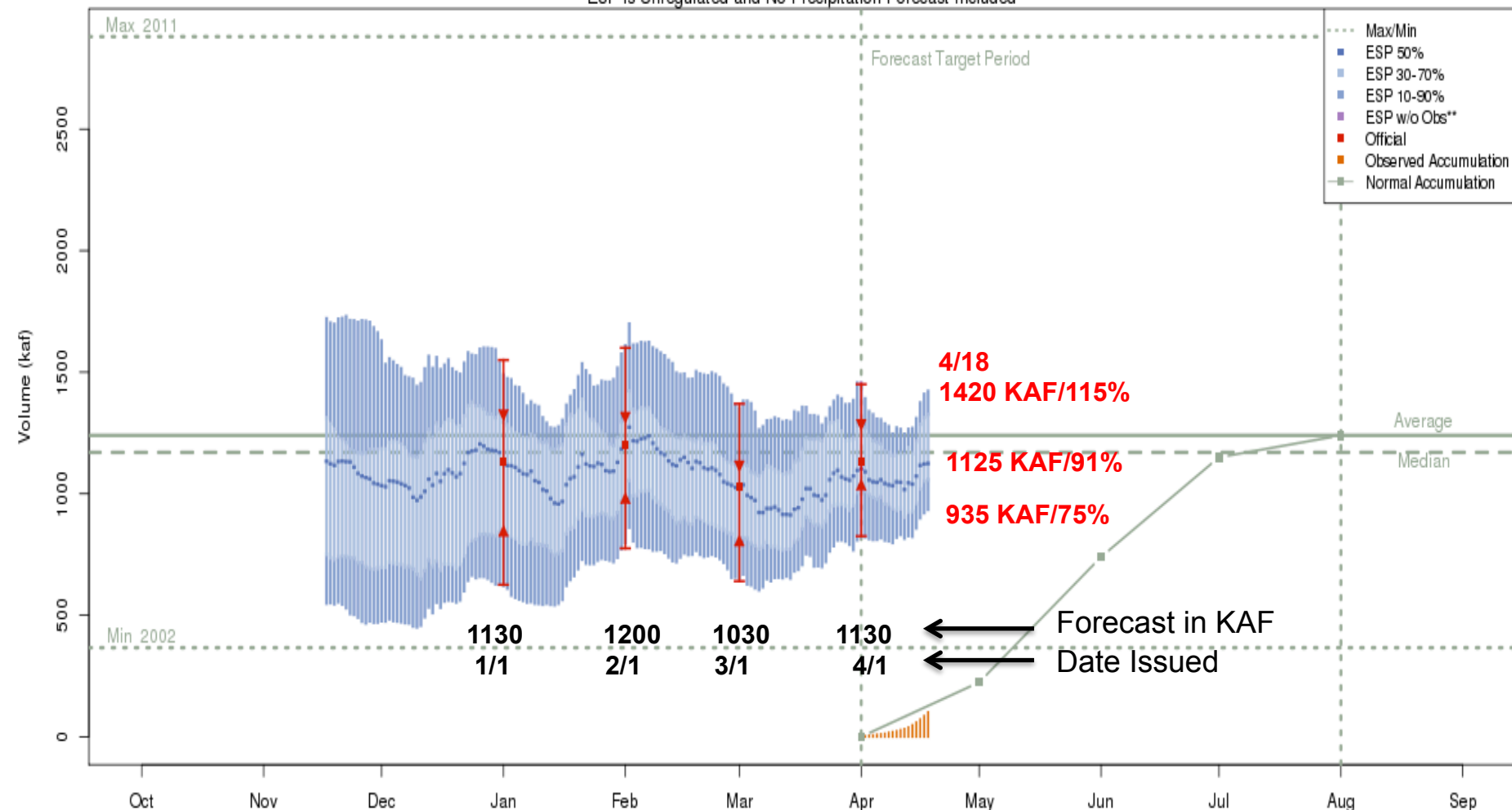


The latest (2016-04-18) 50% ESP forecast is 765 kaf.  
Plot Created 2016-04-18 14:49:44, NOAA / NWS / CBRFC  
Forecasts in the forecast target period include observed values.

# Forecast: Yampa River-Deerlodge

## Seasonal Forecast Progression

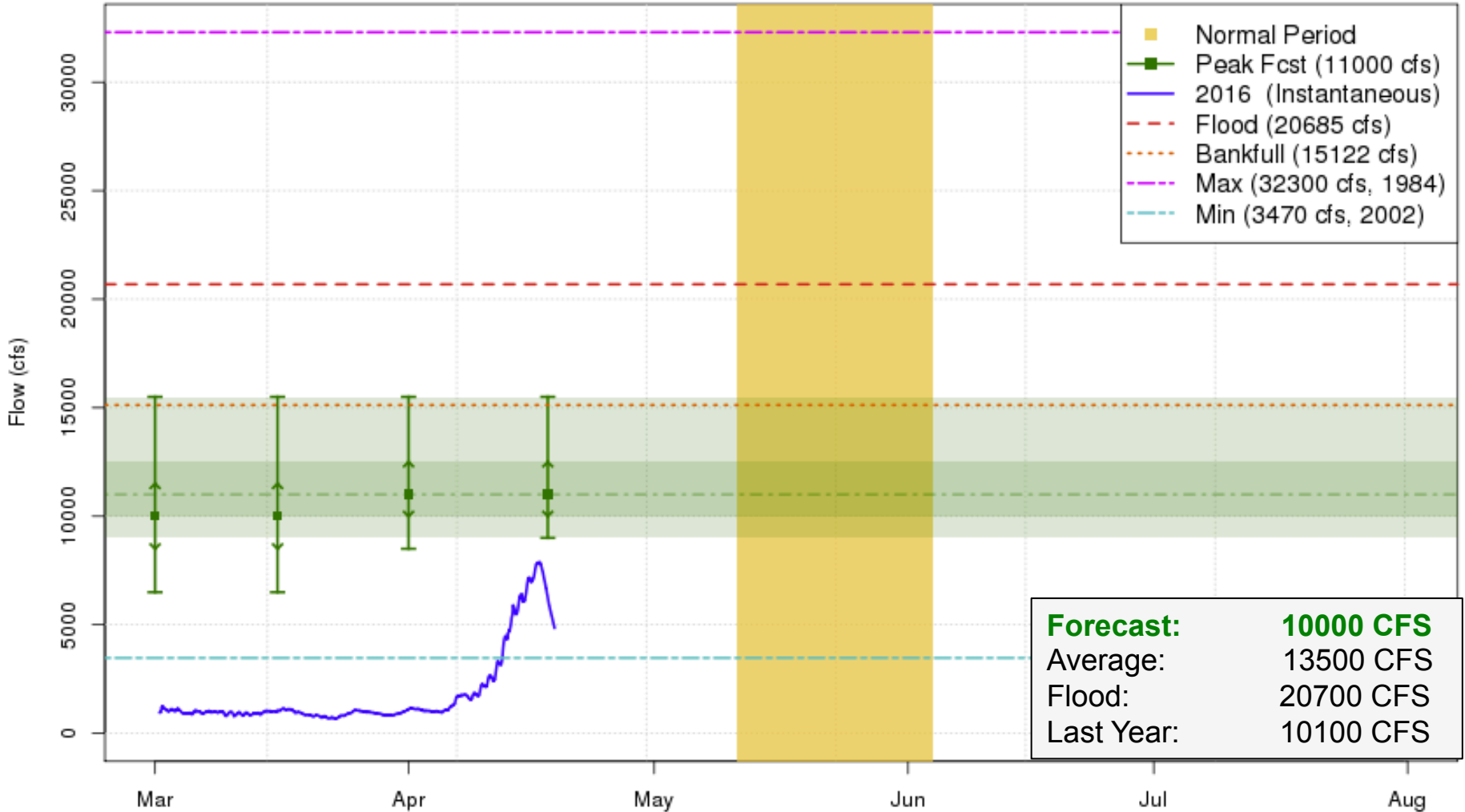
Yampa - Deerlodge Park (YDL C2)  
2016-04-01 Apr-Jul Official 50% Forecast: 1130 kaf (91% of average)  
ESP is Unregulated and No Precipitation Forecast Included



The latest (2016-04-18) 50% ESP forecast is 1124 kaf.  
Plot Created 2016-04-18 15:20:07, NOAA / NWS / CBRFC  
Forecasts in the forecast target period include observed values.

# Peak Flow Forecast: Yampa River-Deerlodge

2016 Mean Daily Peak Flow Forecast  
Yampa - Deerlodge Park (YDLC2)



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

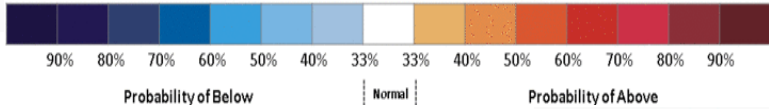
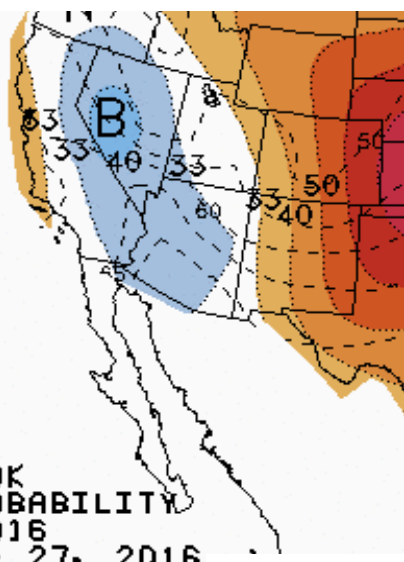
Plot Created 2016-04-18 15:24:45  
CBRFC / NWS / NOAA

# Weather Outlook: Short-Term

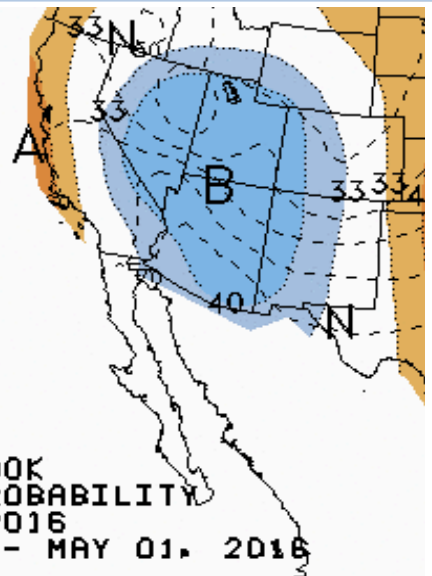
## Temperature



6-10 DAY OUTLOOK  
TEMPERATURE PROBABILITY  
MADE 17 APR 2016  
VALID APR 23 - 27, 2016



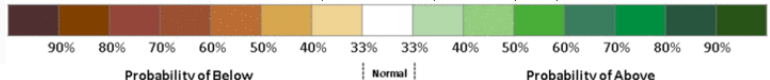
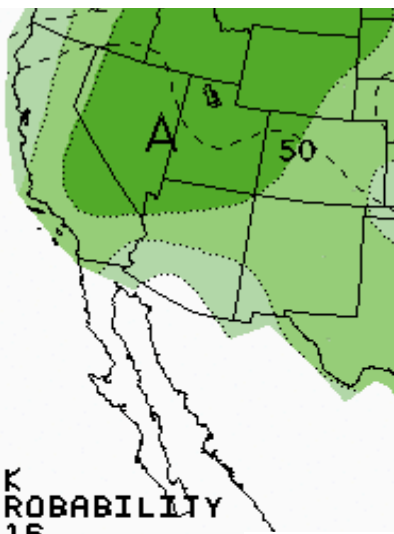
8-14 DAY OUTLOOK  
TEMPERATURE PROBABILITY  
MADE 17 APR 2016  
VALID APR 25 - MAY 01, 2016



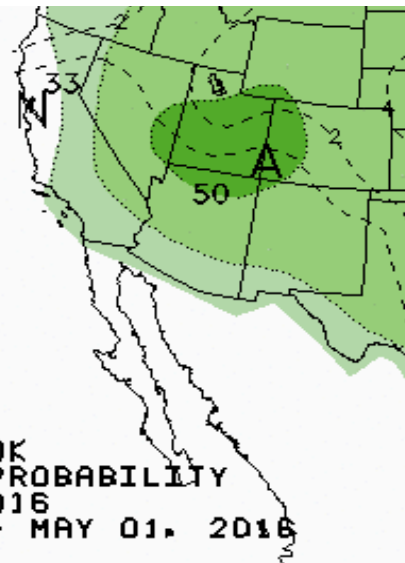
## Precipitation



6-10 DAY OUTLOOK  
PRECIPITATION PROBABILITY  
MADE 17 APR 2016  
VALID APR 23 - 27, 2016



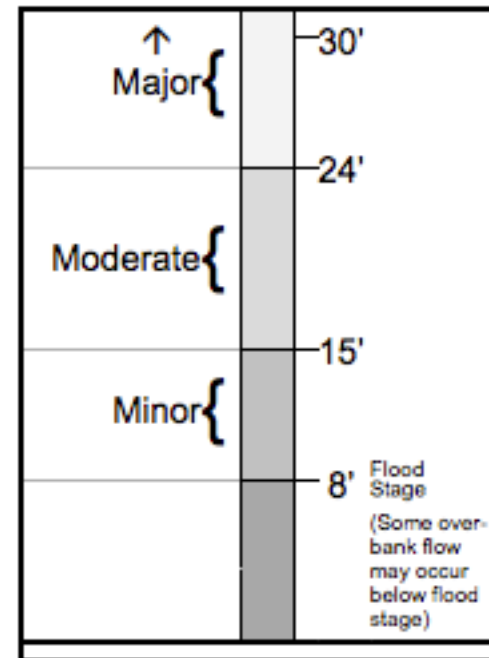
8-14 DAY OUTLOOK  
PRECIPITATION PROBABILITY  
MADE 17 APR 2016  
VALID APR 25 - MAY 01, 2016



# National Weather Service River Critical Levels

Critical levels are defined by local NWS Service Hydrologists so flood watches and warnings can be issued.

- **Bankfull Stage:** established gage height at a given location above which a rise in water surface will **cause the river to overflow the lowest natural stream bank**
- **Flood Stage:** established gage height for a given location at which a **rise in water surface level begins to impacts lives, property, or commerce.**
  - **Minor Flooding:** minimal or no property damage but possible public threat (roads, etc)
  - **Moderate Flooding:** some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations
  - **Major Flooding:** extensive inundation of structures and roads. Significant evacuations/transfers.



**Figure 1.** Stage - flood category relationship.



# National Weather Service River Critical Levels

## Green River near Jensen

Current USGS  
Rating Table

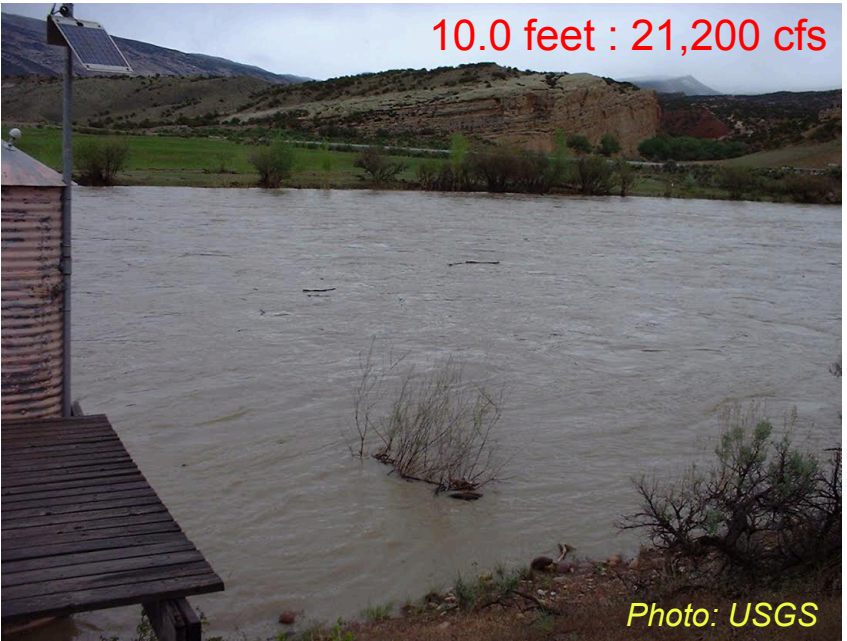
Bankfull Stage = 9.0 feet → ~18,100 cfs

Flood Stage = 10.8 feet → ~24,000 cfs

- *Defined Impacts : Farmers move irrigation pumps and downstream mobile home park near Stewart Lake takes on water*

Moderate = 12.0 feet → ~28,400 cfs

Major = 14.0 feet → ~36,000 cfs



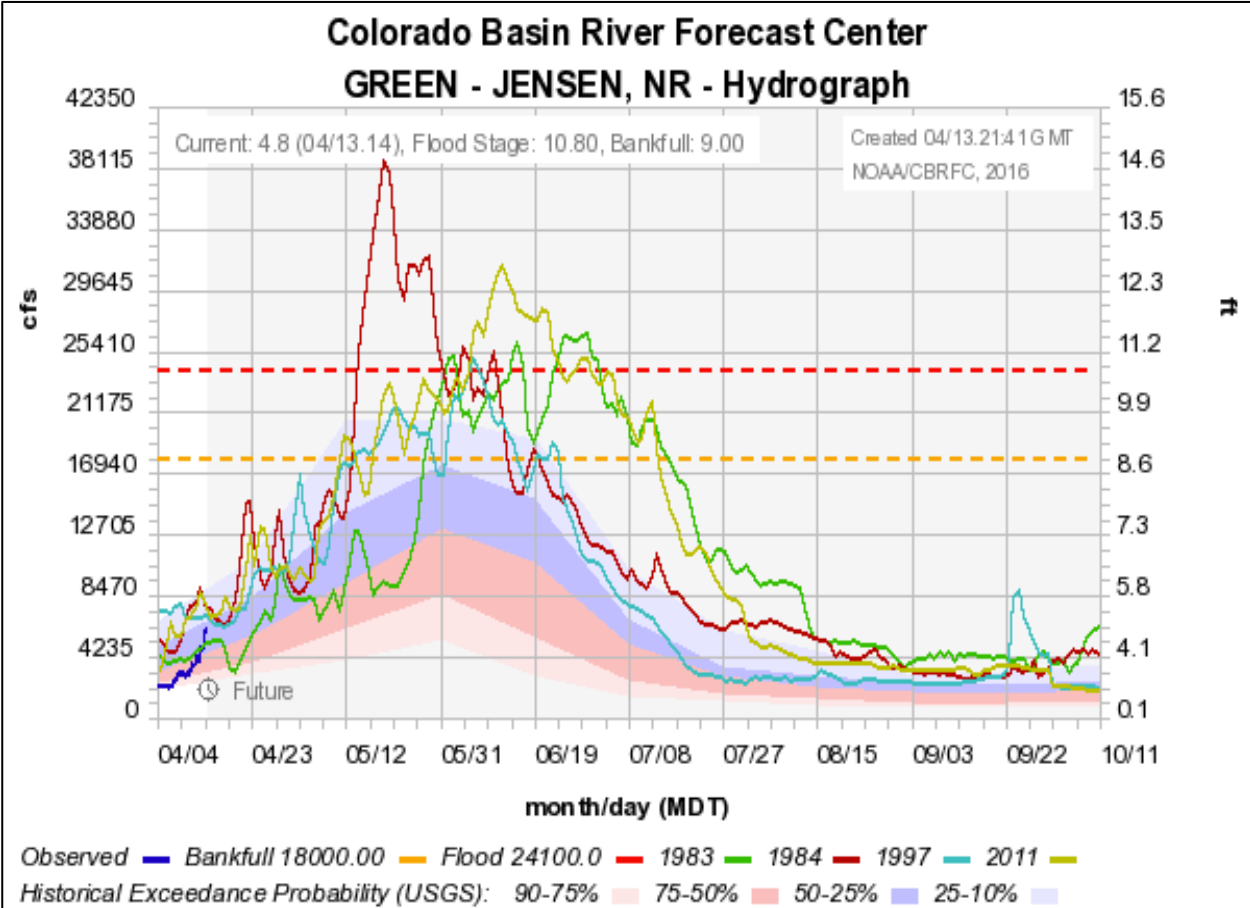
# National Weather Service River Critical Levels

## Green River near Jensen

Bankfull Stage = 9.0 feet → ~18,100 cfs  
 Flood Stage = 10.8 feet → ~24,000 cfs

Current USGS Rating Table

Years since 1980 > Flood Stage
1983
1984
1997
2011



# Contact Us!

- Operational Hydrologist
  - 801-524-5130 x340
  - [cbrfc.operations@noaa.gov](mailto:cbrfc.operations@noaa.gov)
- Michelle Stokes - Hydrologist In Charge
  - [michelle.stokes@noaa.gov](mailto:michelle.stokes@noaa.gov)
- Ashley Nielson-Green River Forecaster
  - [ashley.nielson@noaa.gov](mailto:ashley.nielson@noaa.gov)
  - 801-524-5130 x333

The screenshot shows the Colorado Basin River Forecast Center website. At the top, there is a navigation bar with links for HOME, RIVERS, SNOW, WATER SUPPLY, RESERVOIRS, WEATHER, CLIMATE, HELP, ABOUT, NEWS, and SEARCH. Below the navigation bar, there is a "News" section with two items: "Colorado River Basin Water Supply Briefing - April 7th 11 am MDT - Register here: [Read More...](#)" and "Great Basin Basin Water Supply Briefing - April 7th 1 pm MDT - Register here: [Read More...](#)". The main content area features a "Conditions Map" with a "Help" button. The map displays the Colorado River Basin with numerous data points represented by colored circles. A sidebar on the right contains a "River Conditions" section with a "Data Updated: 03/21/2022" and a "Help" link. Below this, there are several expandable sections: "Snow Conditions", "Water Supply Forecasts", "Peak Flood Probability", "Reservoir Conditions", "Daily Precipitation", "Monthly Precipitation", "Soil Moisture", "Map Options", and "Search Points".

[www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

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# Questions?



# *Why is the Flaming Gorge forecast only ~75 % of average when the snowpack is near normal?*

## **1. Dry fall soil moisture conditions**

- Can impact spring runoff efficiency
- Negative impact on the forecasts

## **2. High elevation snow conditions are not as good**

- Rain rather than snow in Fall, normally snow
- SNOTELS don't represent this area
- Largest contributing area for water supply

## **3. Distribution of snow in contributing areas**

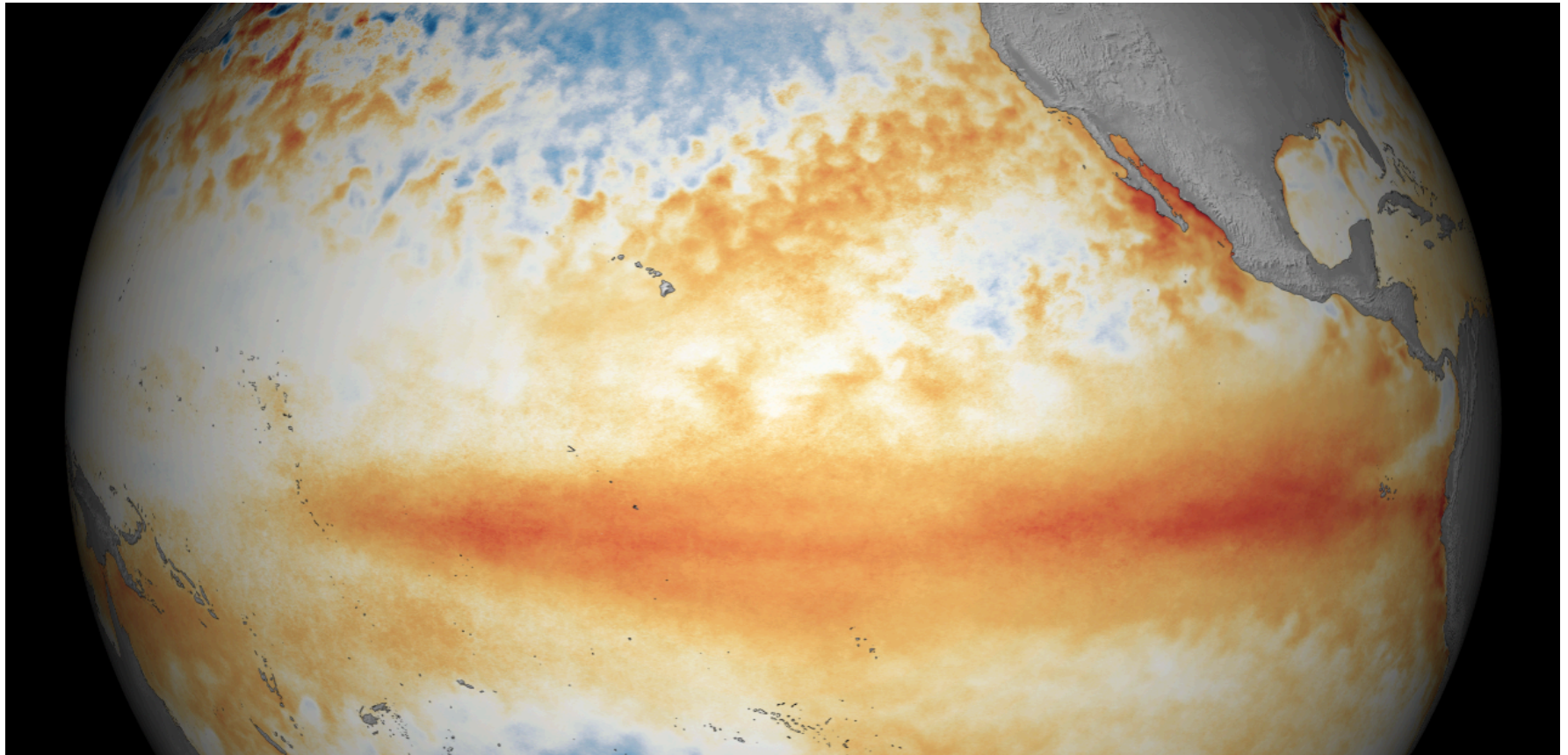
- Flaming Gorge Inflow = Green River + Local (Hams Fork, Uintas, Big Sandy)
- Green River = ~80% Local = ~20%
- Green River Breakdown

Wind Rivers → Below normal snow → ~75-80% of inflow

Wyoming Range → Normal snow → ~20-25% of inflow

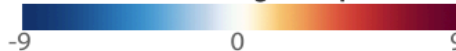
# El Niño Event

- Still a strong event but has been weakening over the past several weeks.
- The 2015-2016 will go down as one of the strongest on record (82-83, 97-98)
- Impacts the Jet stream strength, location, and storm tracks (favors LC Basin)
- No strong correlation between ENSO and April-July runoff volumes in Green River Basin
- La Niña conditions are possible by later this fall (~50% chance)



March 2016  
compared to 1981-2010

Difference from average temperature (°F)



Climate.gov/NNVL  
Data: Geo-Polar SST