

May 2016

Colorado River Basin Water Supply Briefing

May 5, 2016

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Hydrologist

Colorado Basin River Forecast Center
National Weather Service
NOAA

Conference Phone #: 877-929-0660
Passcode #: 1706374

Please mute your phone
until ready to ask questions



Today's Presentation

April Weather

Current conditions impacting forecasts

Overview of May water supply forecasts

Peak flow forecasts

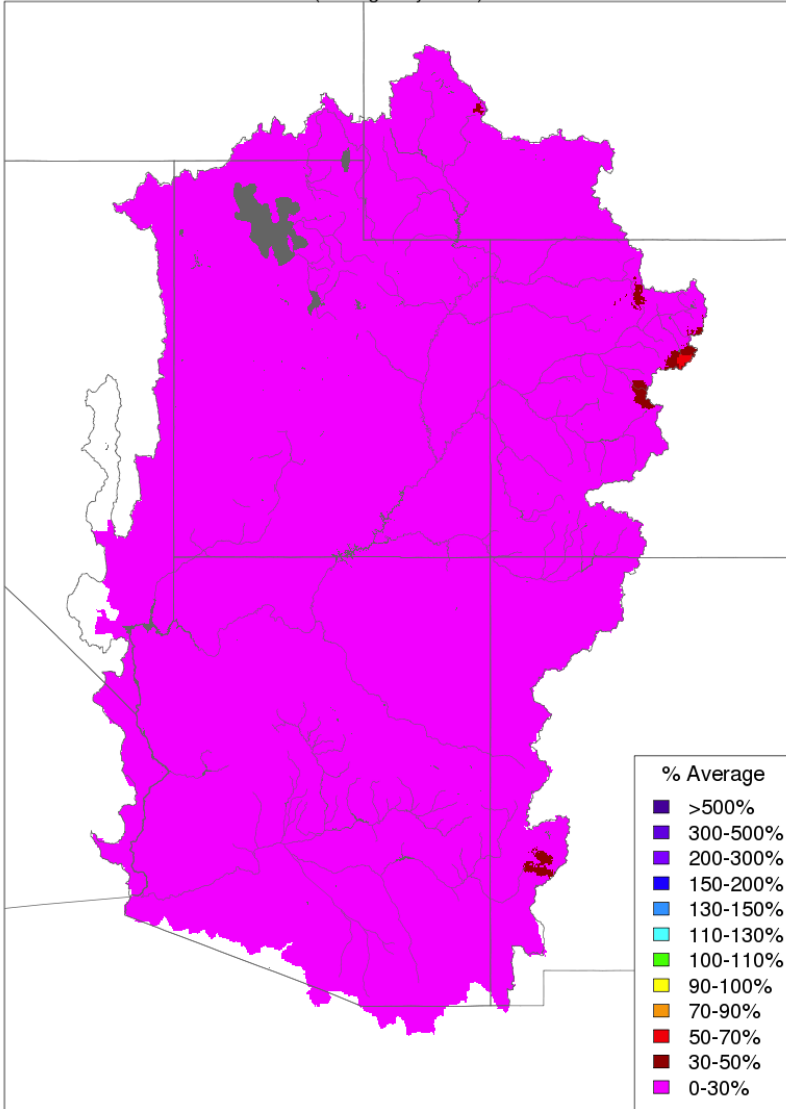
Upcoming weather and longer range outlooks

Contacts

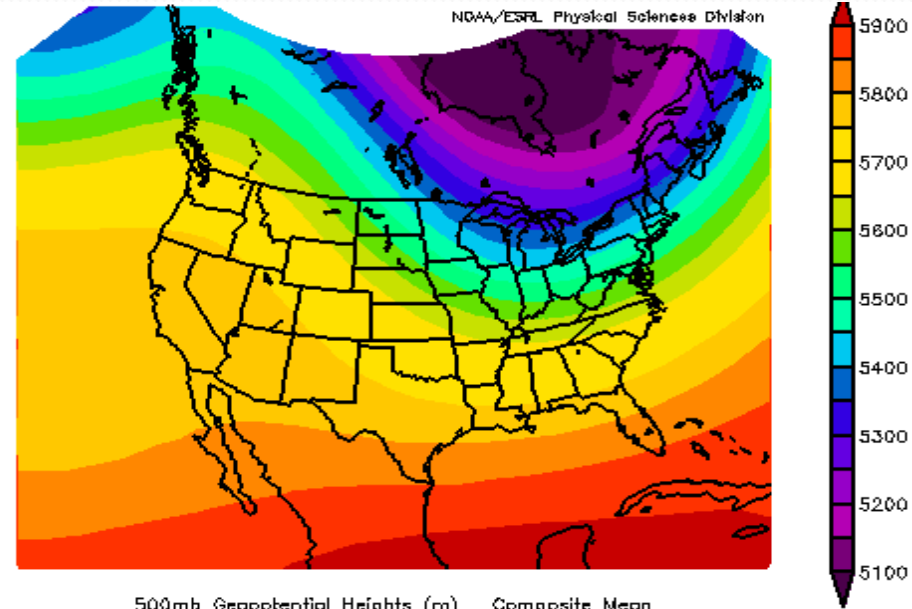
*** Please mute your phone until ready to ask questions ***

April Weather

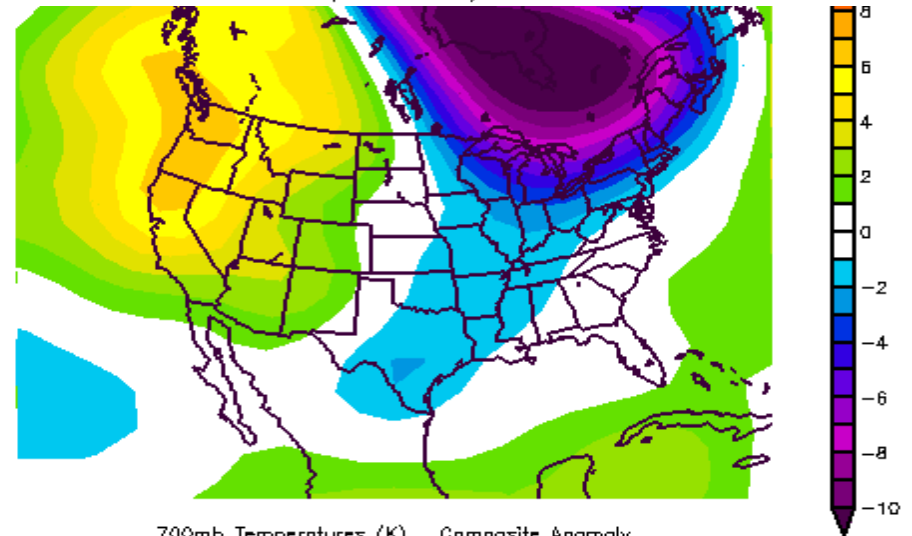
Month to Date Precipitation - April 07 2016
(Averaged by Basin)



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



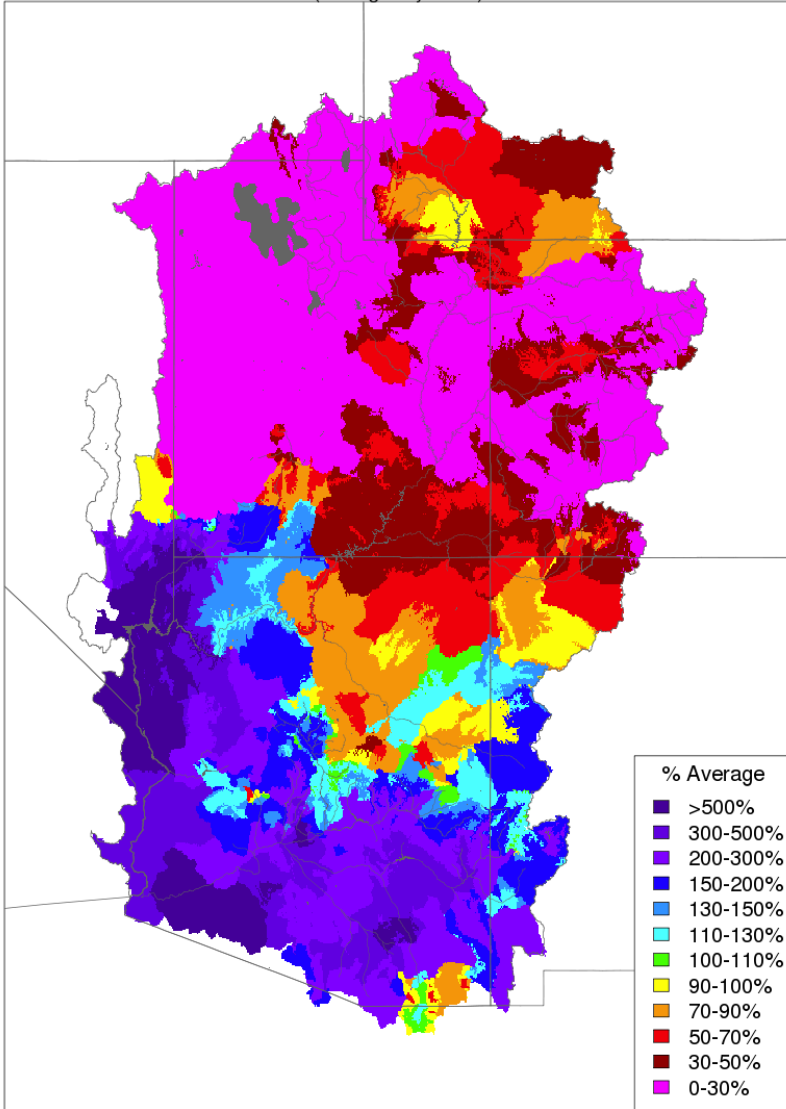
500mb Geopotential Heights (m) Composite Mean
4/1/16 12z to 4/7/16 12z
NCEP/NCAR Reanalysis



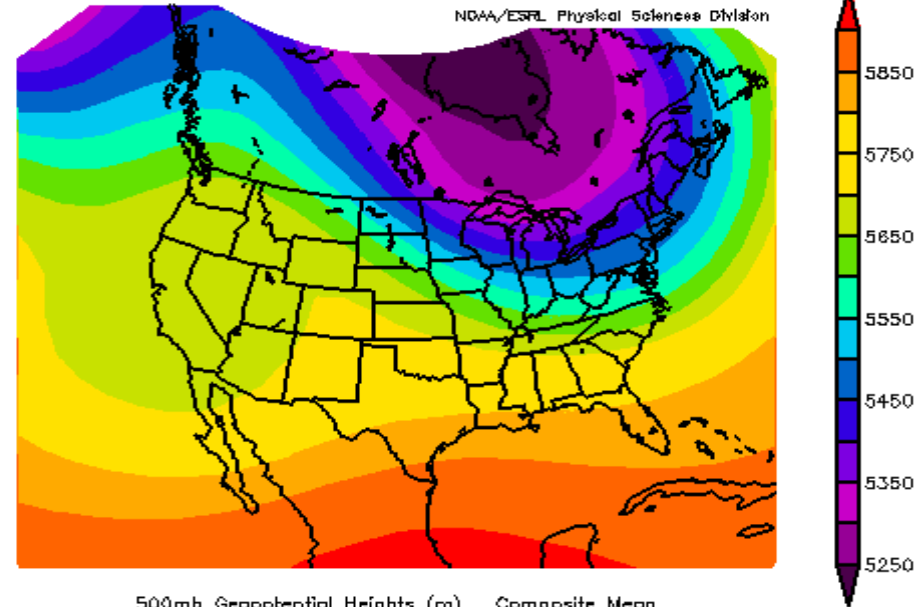
700mb Temperatures (K) Composite Anomaly
4/1/16 12z to 4/7/16 12z
NCEP/NCAR Reanalysis

April Weather

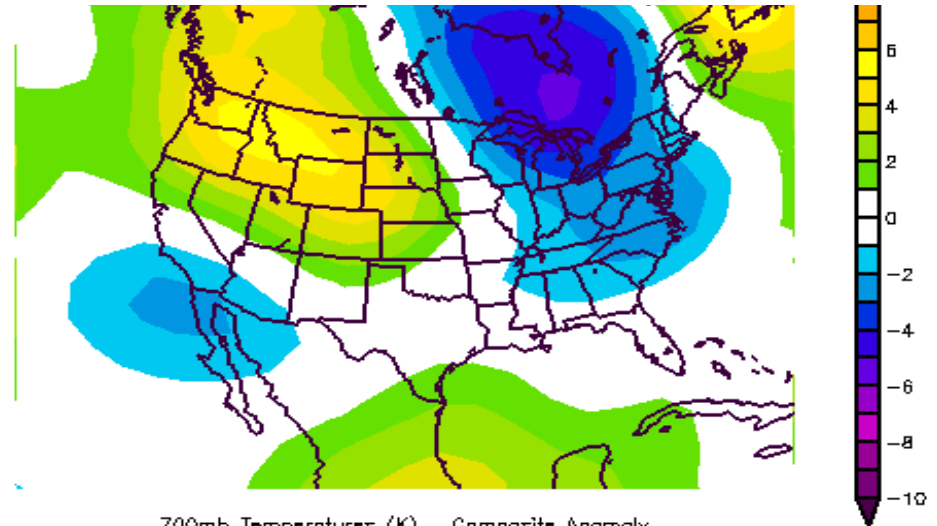
Month to Date Precipitation - April 12 2016
(Averaged by Basin)



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



500mb Geopotential Heights (m) Composite Mean
4/8/16 12z to 4/12/16 12z
NCEP/NCAR Reanalysis



700mb Temperatures (K) Composite Anomaly
4/8/16 12z to 4/15/16 12z
NCEP/NCAR Reanalysis



April 2016 Notables for Las Vegas

All of these data are valid for McCarran International Airport.
Records date back to 1938.

Total Rainfall for the Month

- **2.26 inches** (2nd all time for April)
- Monthly record is 2.44 inches (1965)
- The last month with over 2 inches of rain was August 2012.

Number of Measurable Precipitation Days

- **7** (2nd all time for April)
- Monthly record is 8 (1965)
- Two days with greater than 0.50 inches measured. For a single calendar day, this has occurred only 7 times in April.

Number of Thunderstorm Days

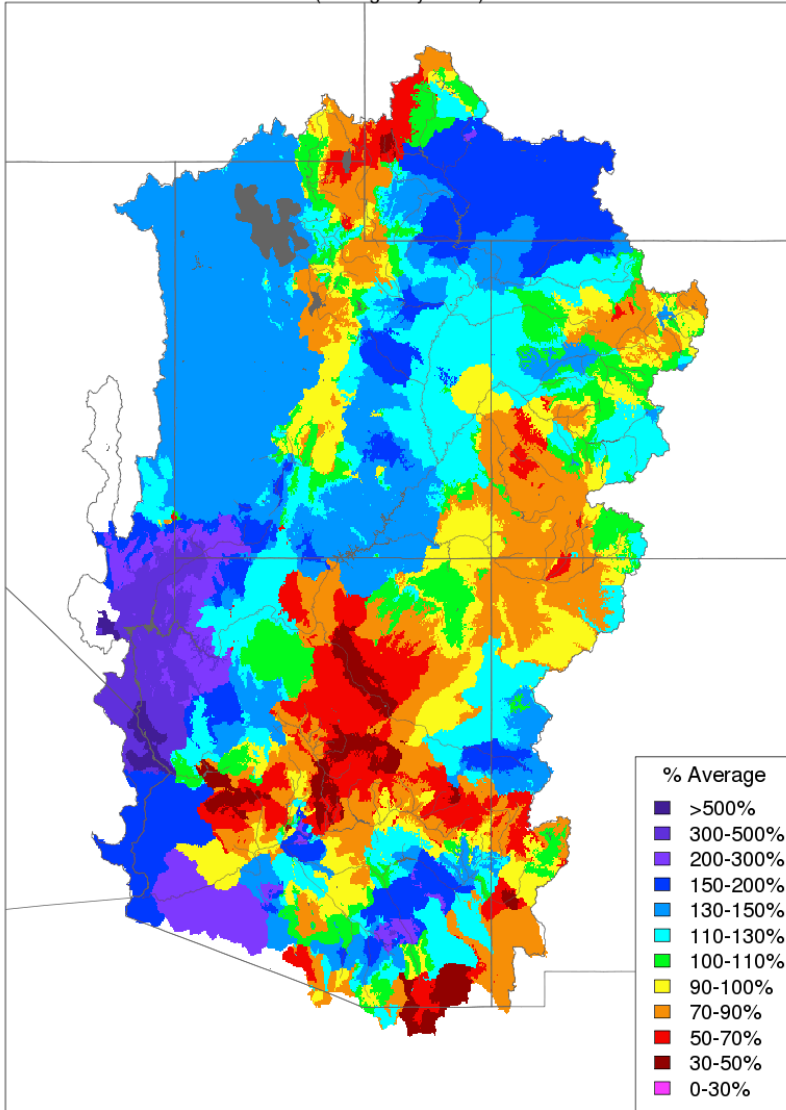
- **5** (1st all time for April)
- Previous record was 4 (1941)

Other Notables

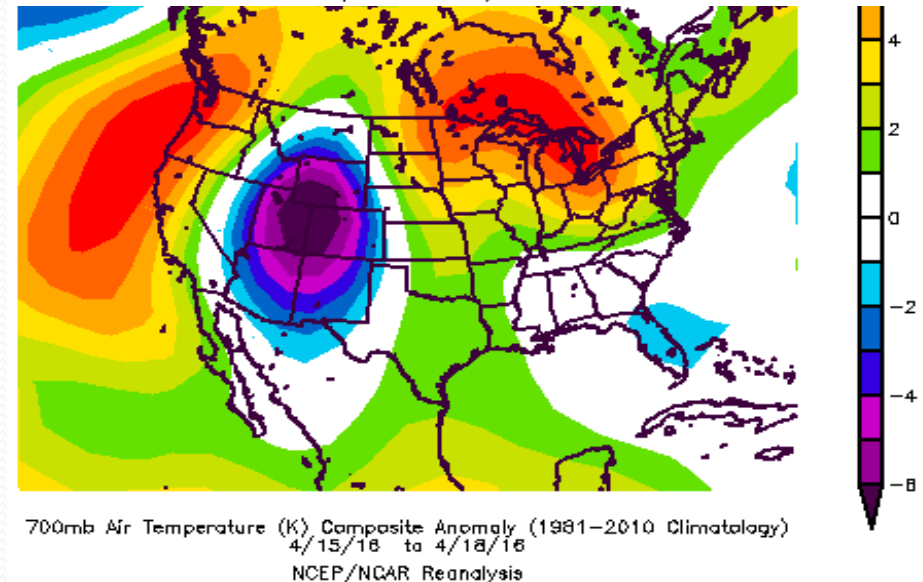
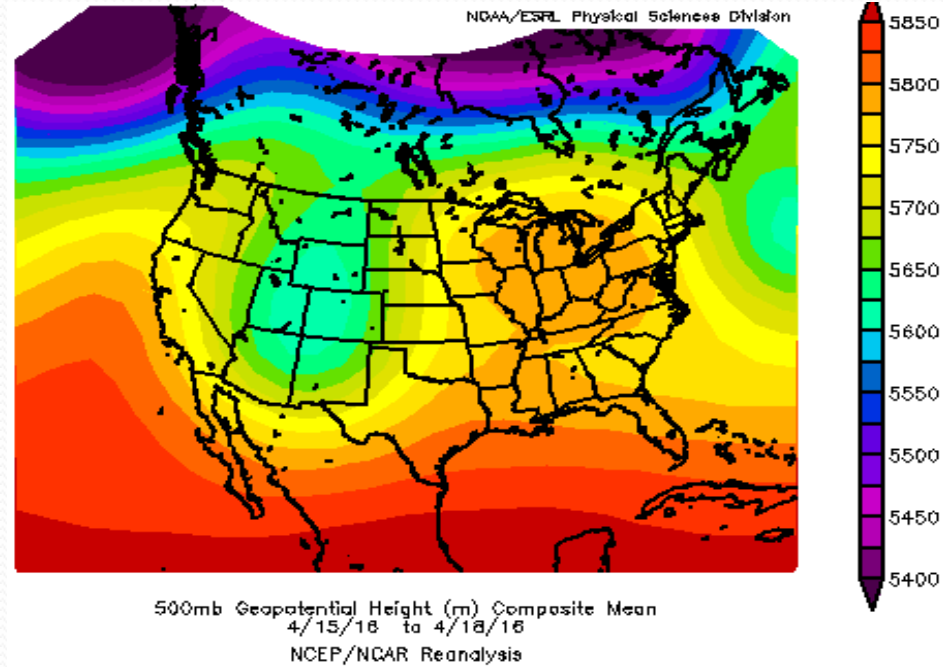
- The 0.93 inches recorded on April 30 was the 2nd highest for an April calendar day. The highest was 0.97 inches on April 12, 1965.
- Number of calendar day precipitation records broken in 2016: **4**.

April Weather

Month to Date Precipitation - April 30 2016
(Averaged by Basin)

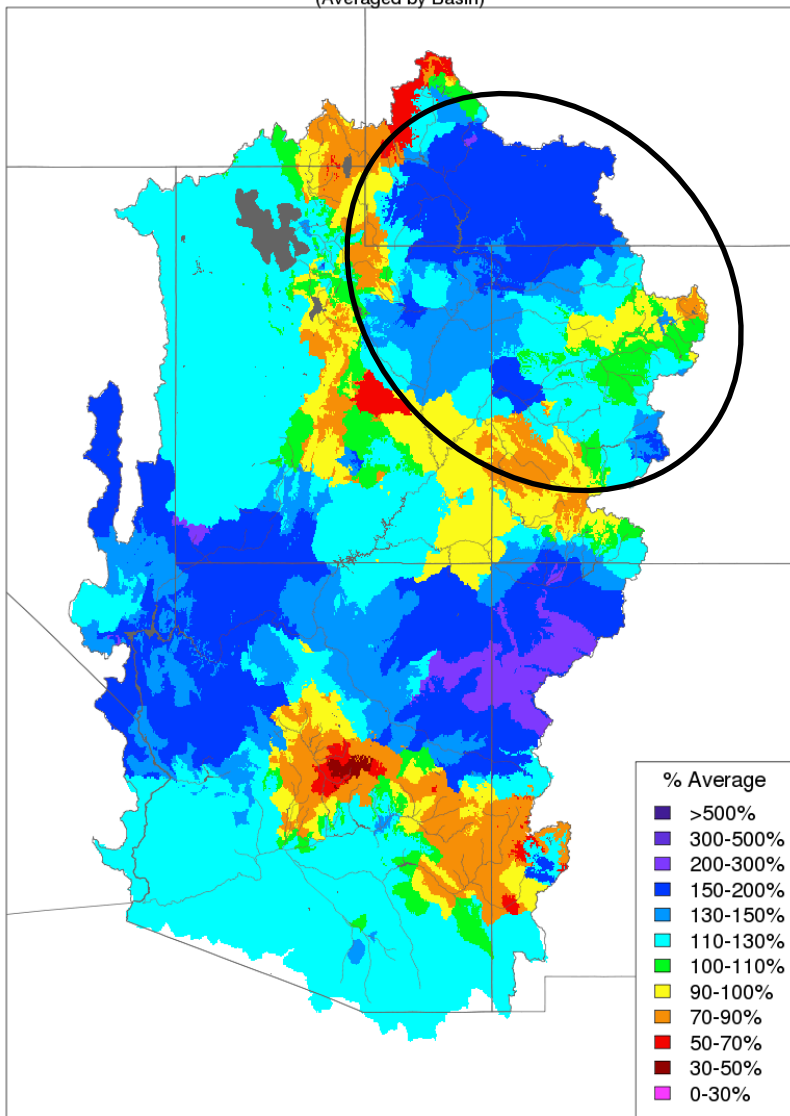


Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov



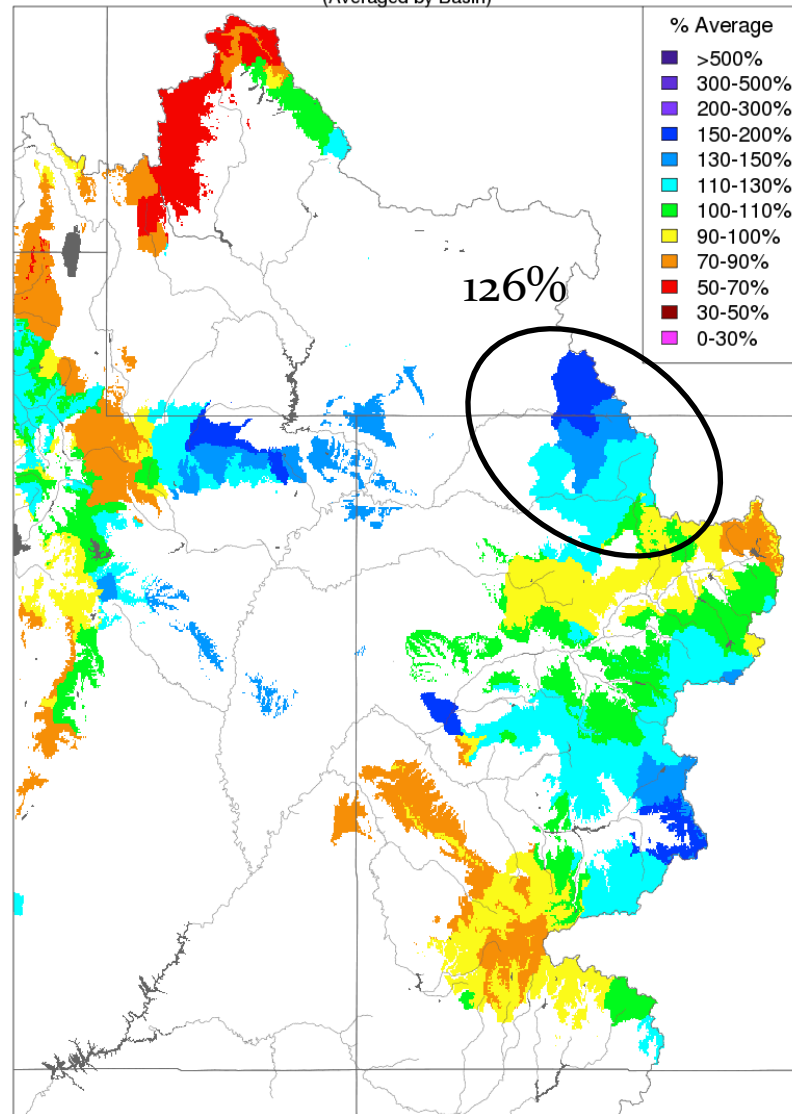
April Precipitation

Monthly Precipitation - April 2016
(Averaged by Basin)



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

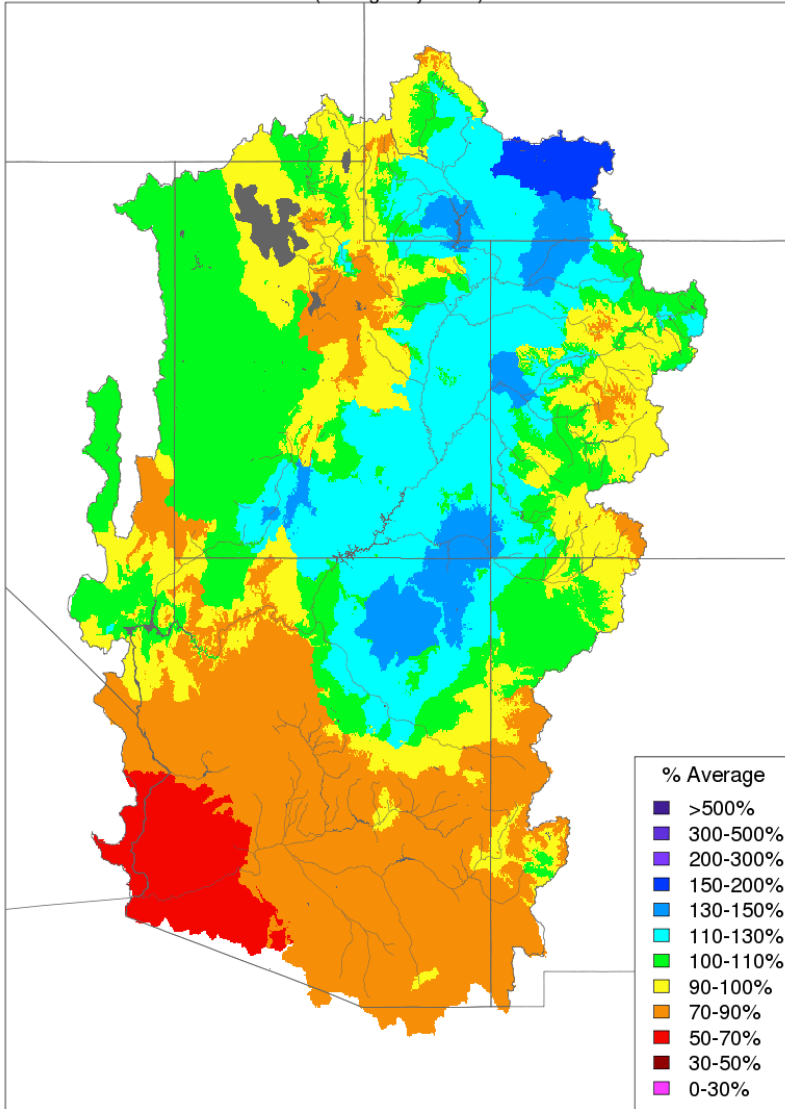
Monthly Precipitation - April 2016
(Averaged by Basin)



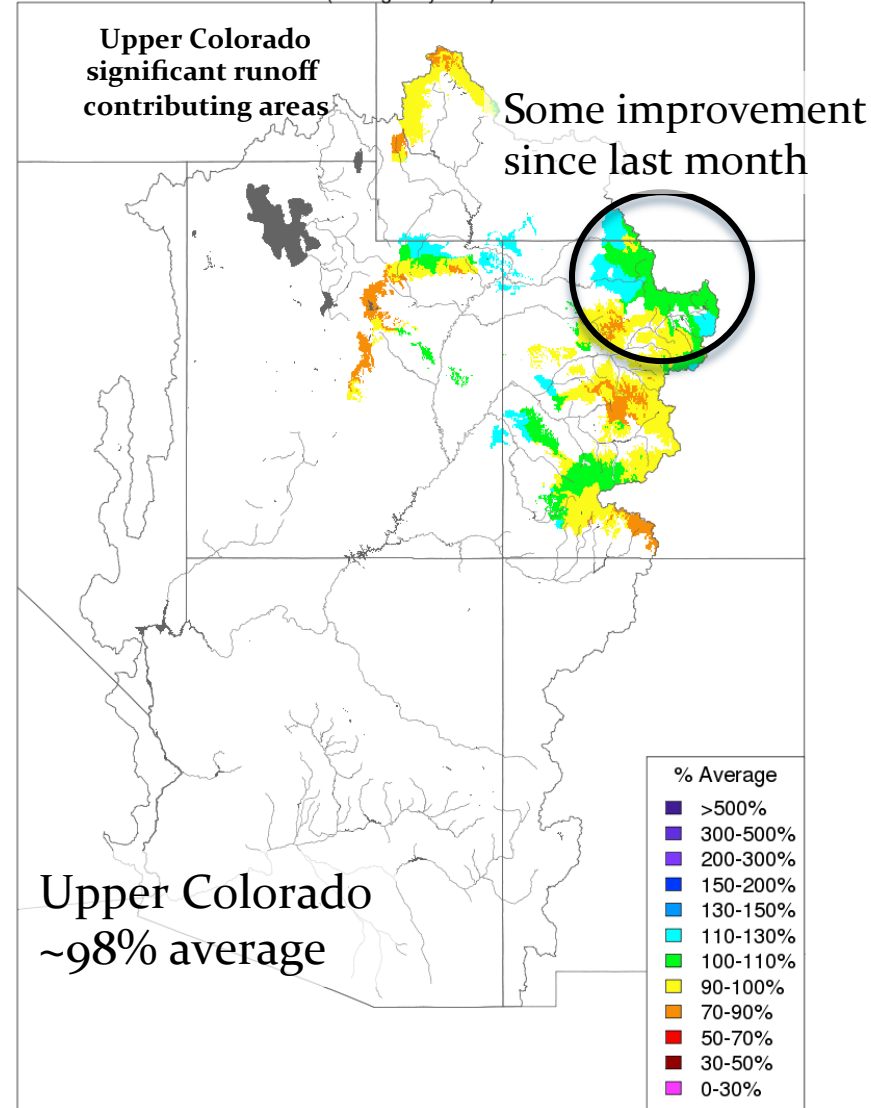
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Water Year Precipitation

Water Year Precipitation, October 2015 - April 2016
(Averaged by Basin)

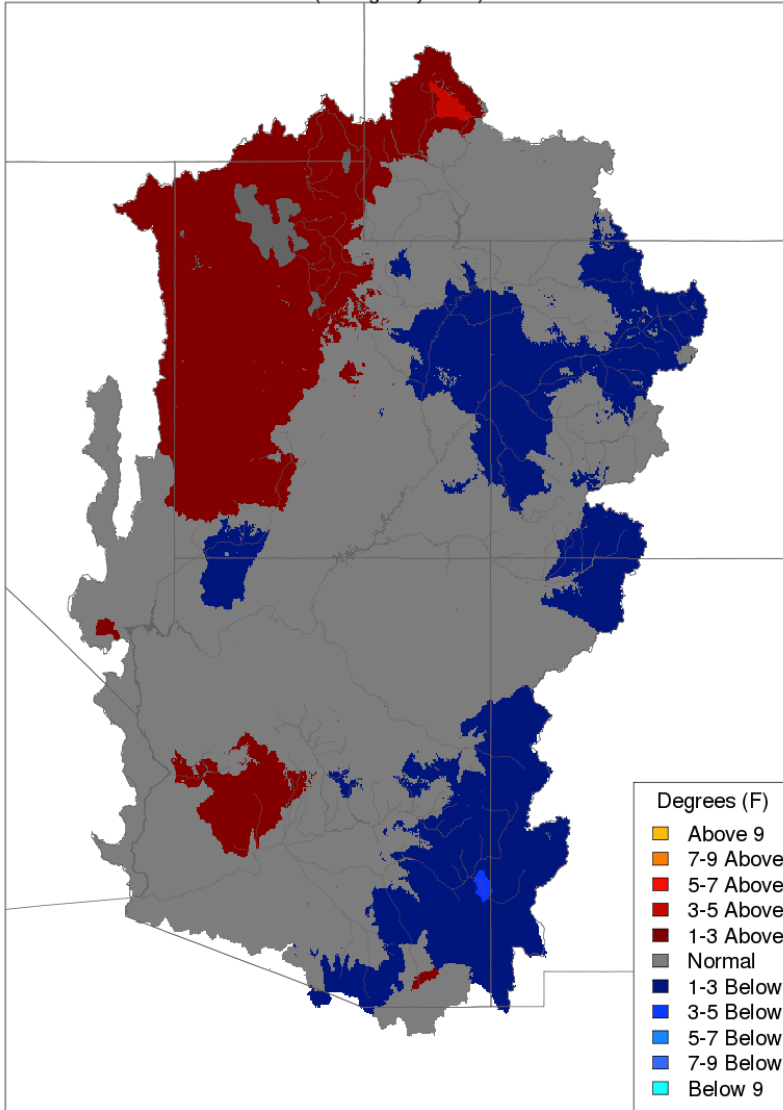


Water Year Precipitation, October 2015 - April 2016
(Averaged by Basin)



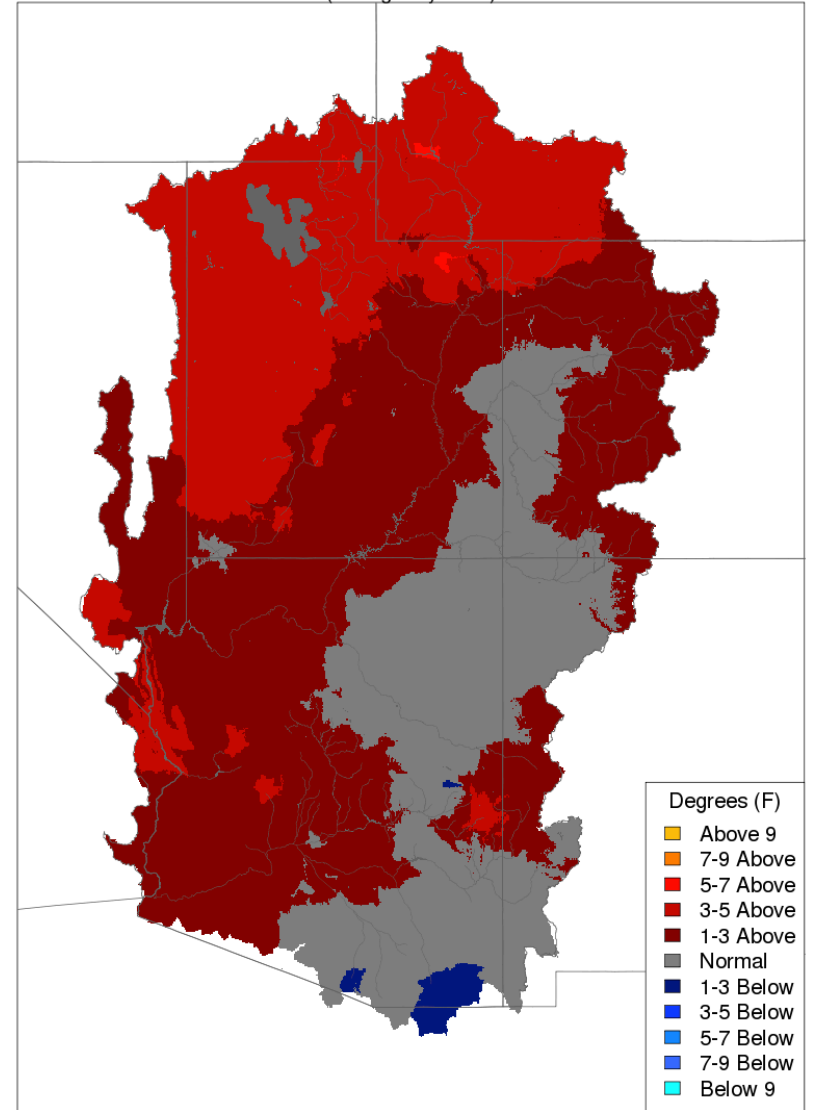
April Temperature

Max Temp - Monthly Deviation - April 2016
(Averaged by Basin)



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

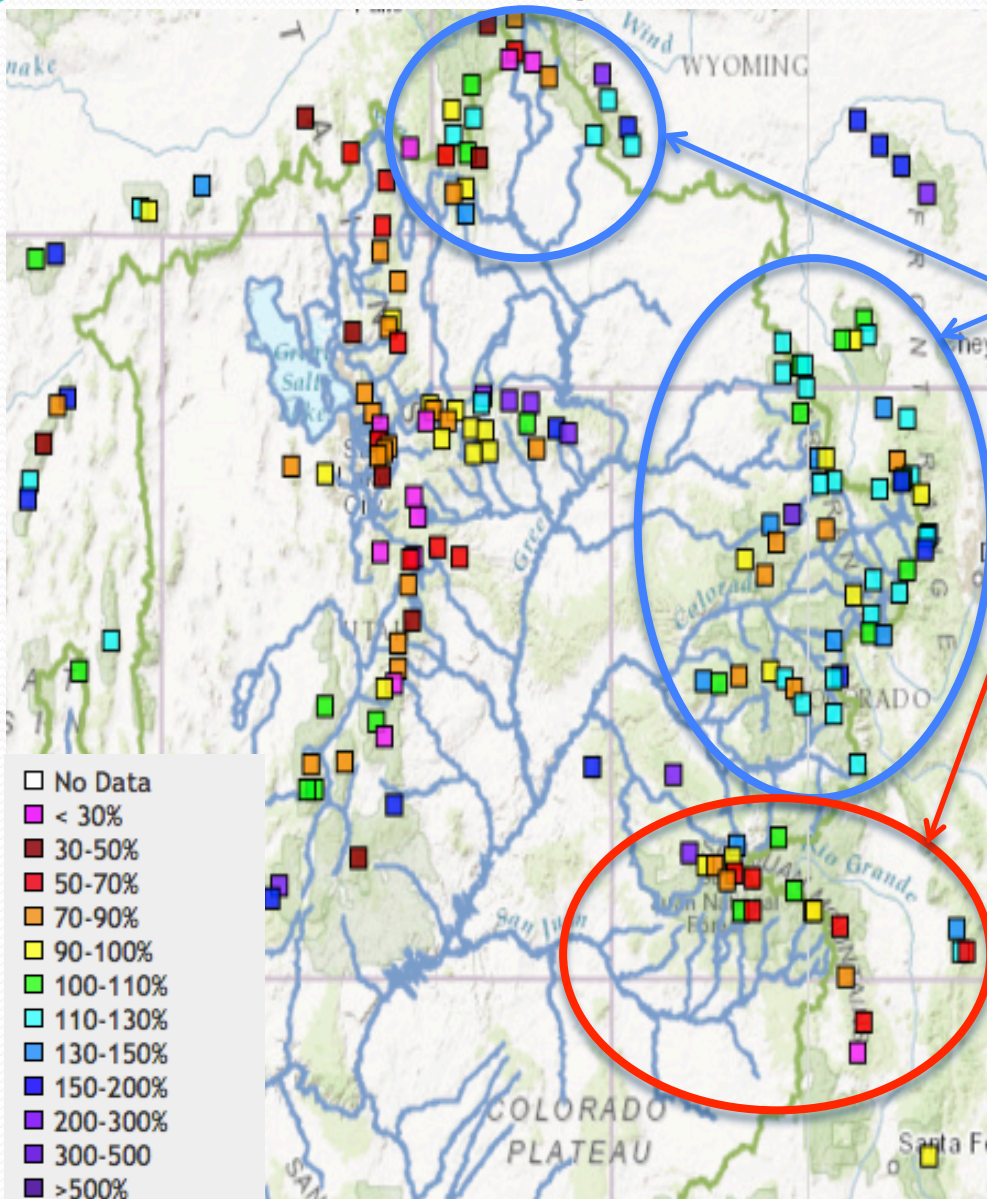
Min Temp - Monthly Deviation - April 2016
(Averaged by Basin)



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

Snow – SNOTEL Network

Snow (% median): May 3, 2016



Percent median snow water equivalent changes since April 1:

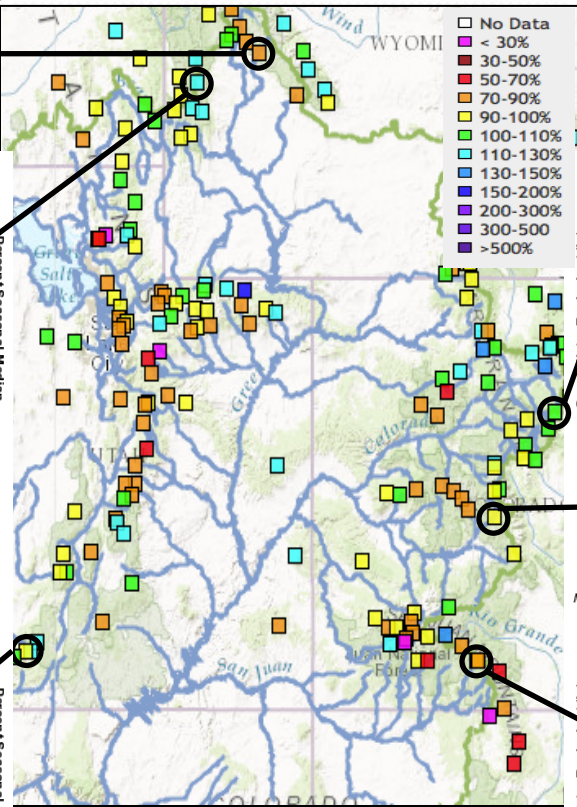
- Generally increased due to storms and cooler temperatures in the latter half of April.

- Continued snowmelt in the San Juan River Basin; impacts from recent storms were a bit less.

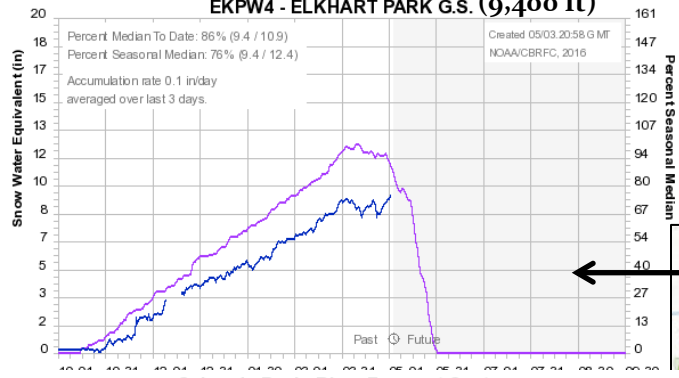
Be cautious of percent of median values this time of year. Low normal values can result in large changes and swings in the percent of median value!

Snow – SNOTEL Network

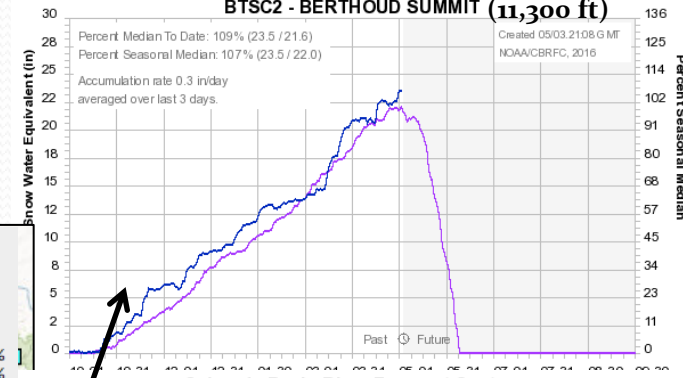
Snow (% median):
May 3, 2016



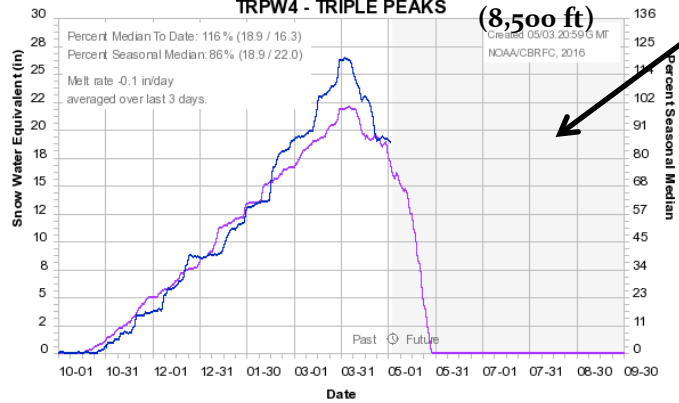
Colorado Basin River Forecast Center
EKPW4 - ELKHART PARK G.S. (9,400 ft)



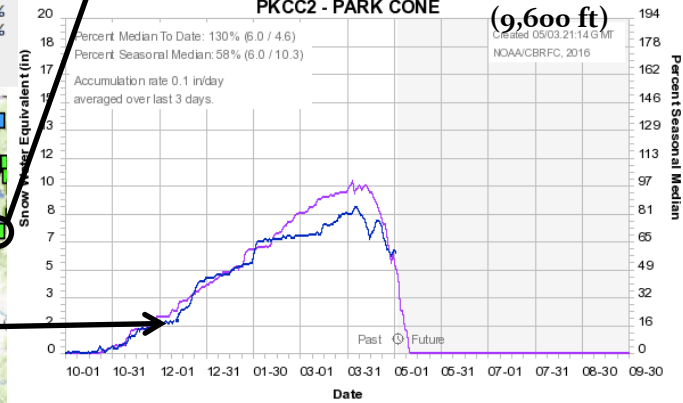
Colorado Basin River Forecast Center
BTSC2 - BERTHOUD SUMMIT (11,300 ft)



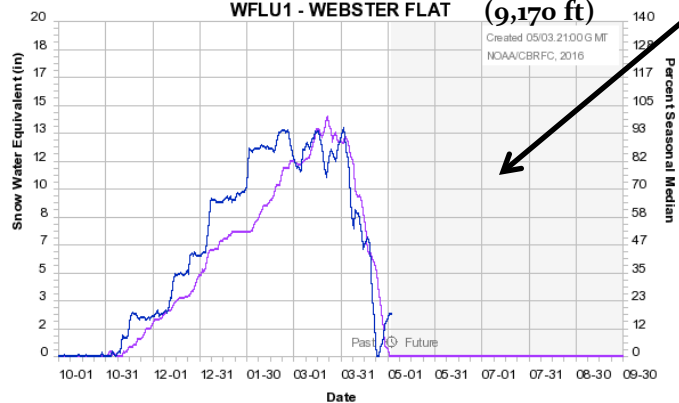
Colorado Basin River Forecast Center
TRPW4 - TRIPLE PEAKS (8,500 ft)



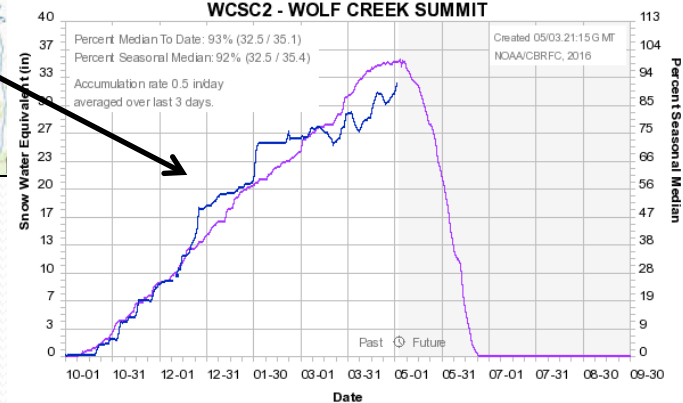
Colorado Basin River Forecast Center
PKCC2 - PARK CONE (9,600 ft)



Colorado Basin River Forecast Center
WFLU1 - WEBSTER FLAT (9,170 ft)



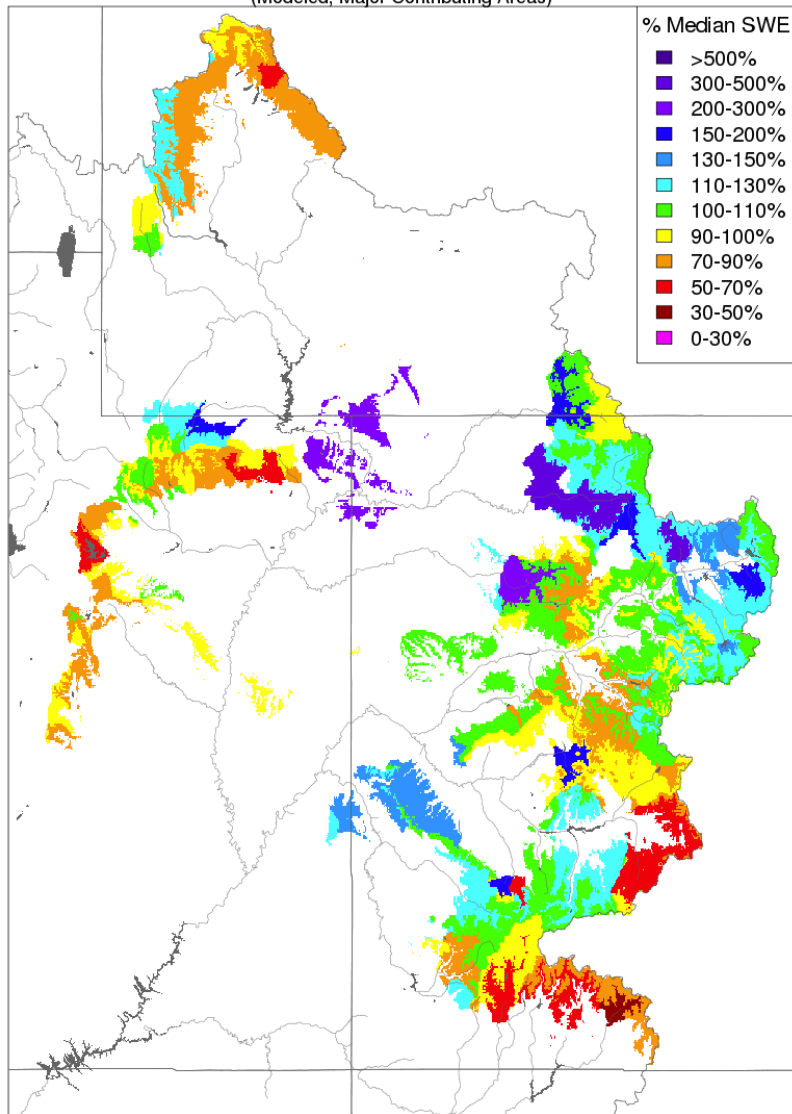
Colorado Basin River Forecast Center
WCSC2 - WOLF CREEK SUMMIT (11,000 ft)



Snow – CBRFC Hydrologic Model

Snow Conditions - April 01 2016

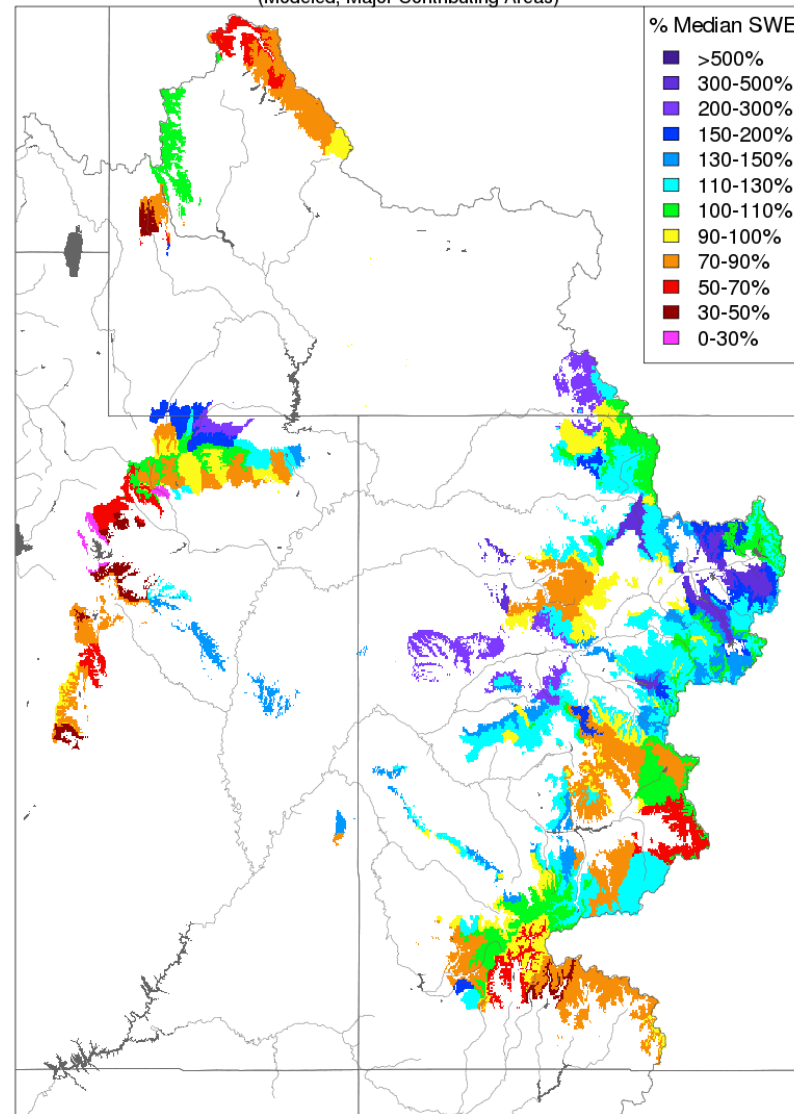
(Modeled, Major Contributing Areas)



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

Snow Conditions - May 01 2016

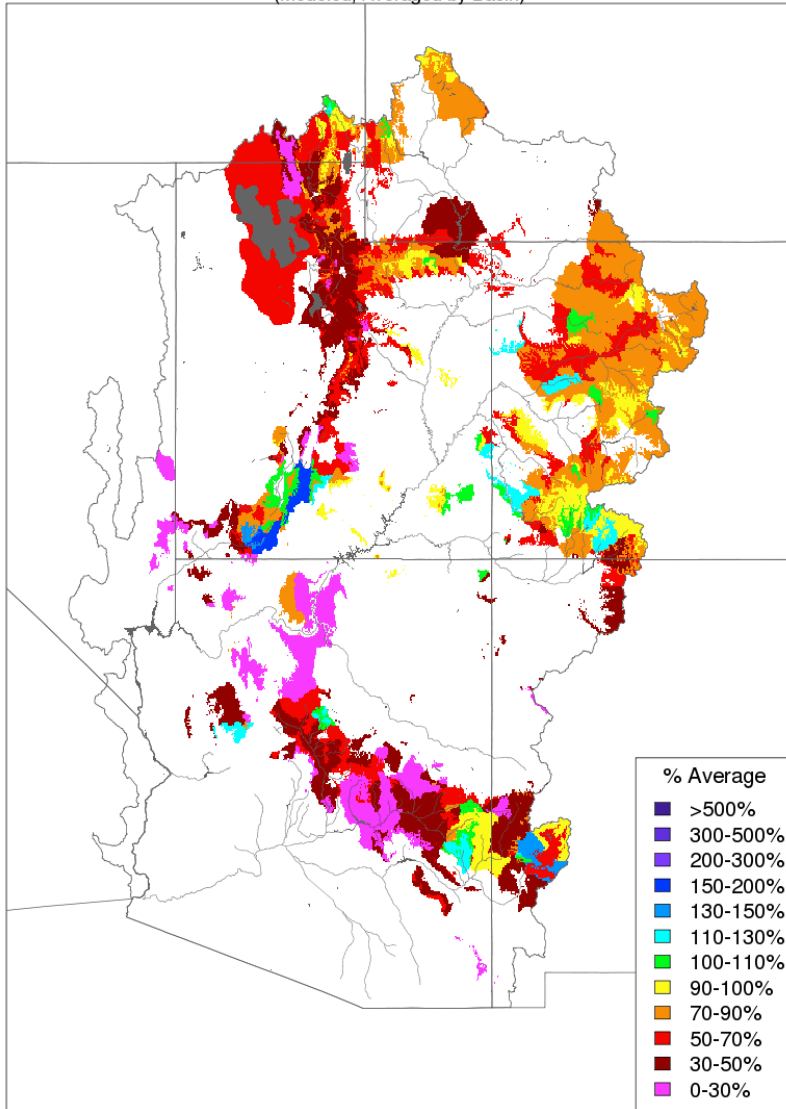
(Modeled, Major Contributing Areas)



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

Model Soil Moisture – Fall % Average

Soil Moisture - Fall - 2015 (November 15)
(Modeled, Averaged by Basin)

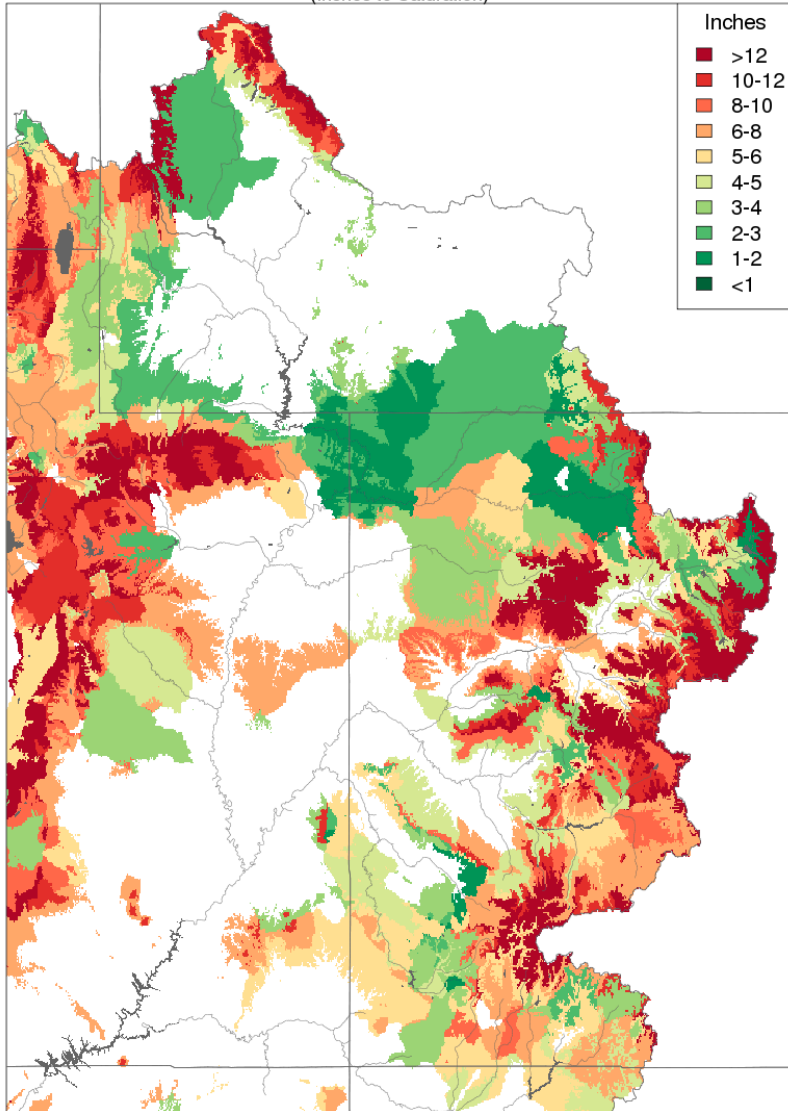


Dry fall soil moisture conditions over most of the Upper Colorado River Basin (as represented by the CBRFC's hydrologic model) have negatively impacted streamflow forecasts this year.

Lower basin conditions can be more variable, as fall and spring rains and other storm events can impact soil moisture conditions significantly

Model Soil Moisture - Saturation

Soil Moisture - May 01 2016
(Inches to Saturation)



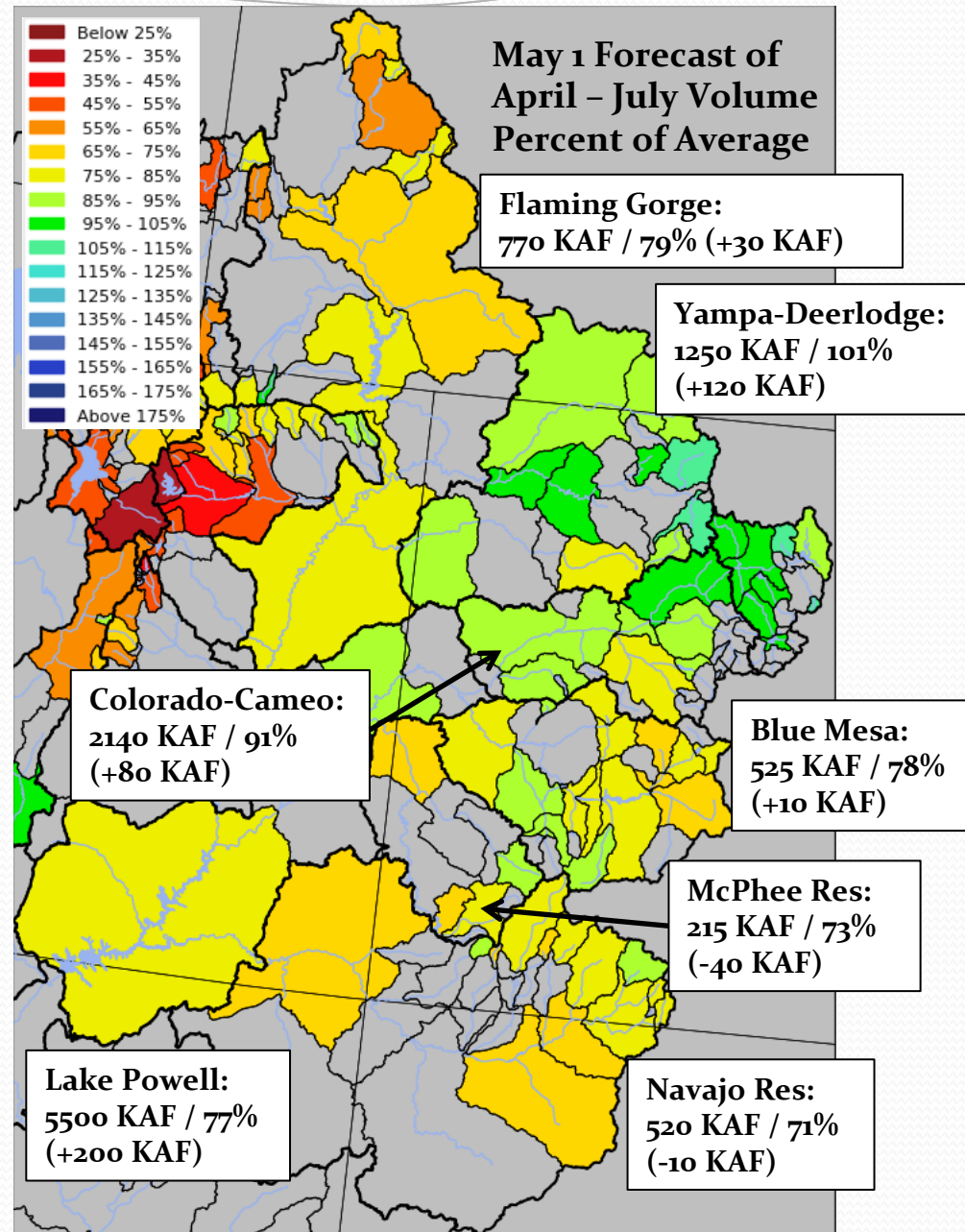
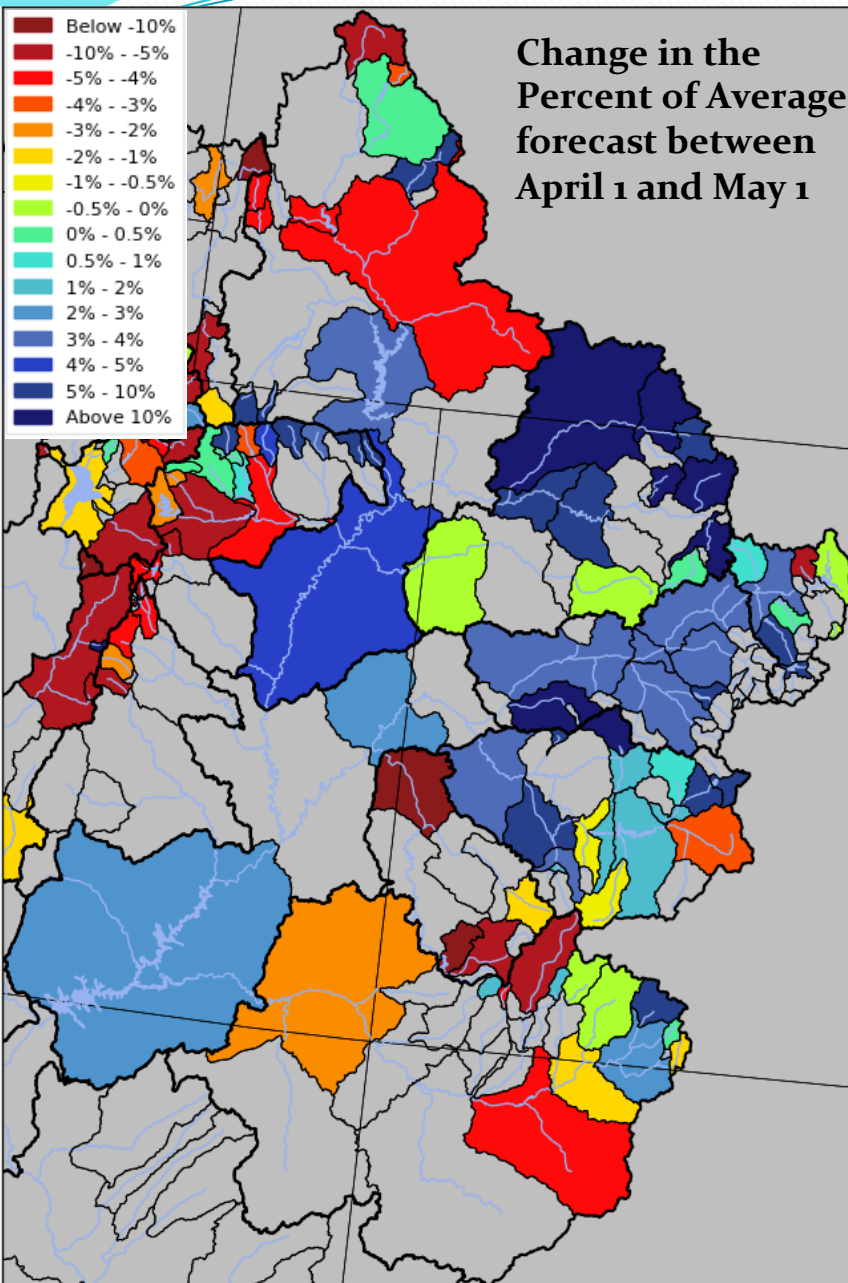
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

This “Inches to Saturation” soil moisture map gives an indication of where soils are becoming saturated in the CBRFC hydrologic model due to snowmelt and/or rainfall. Dark green areas show where the model may begin to produce runoff with additional moisture input.

This map is primarily intended to assess runoff efficiency in the Lower Colorado River Basin during winter rain events.

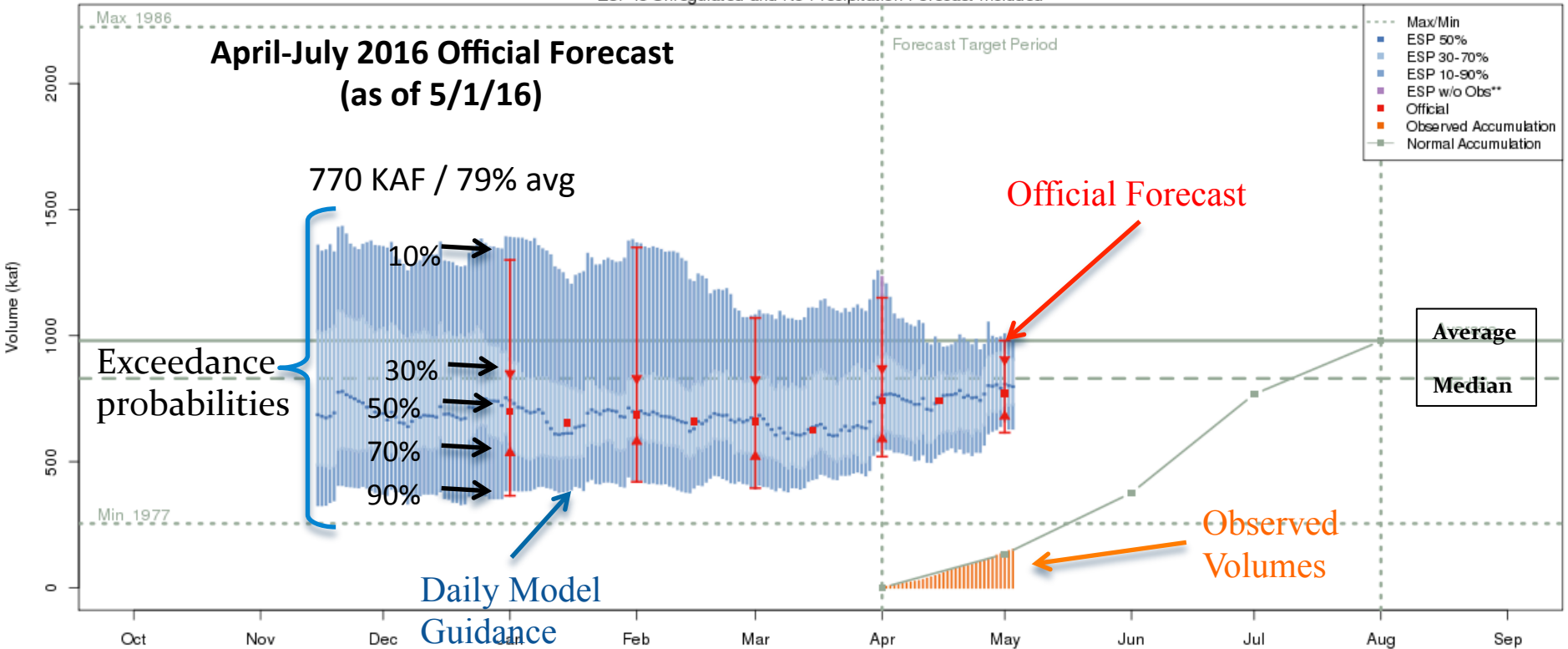
It **does not** affect the water supply volume forecasts in the Upper Colorado River Basin, but can provide some information during the spring snowmelt.

April – July Forecast Streamflow Volumes



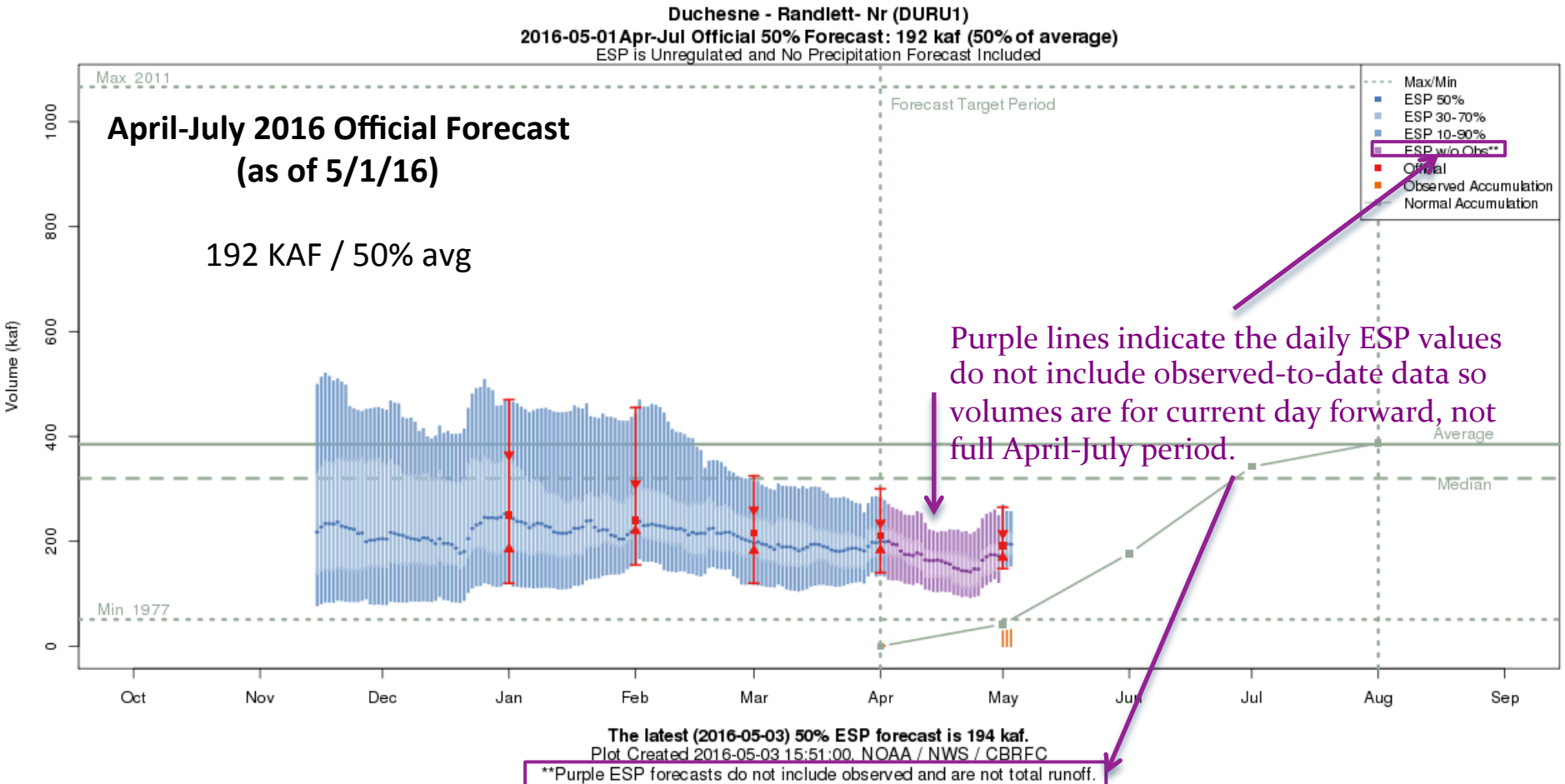
Forecast Evolution Plot – Flaming Gorge

Green - Flaming Gorge Res- Flaming Gorge Dam- At (GRNU1)
 2016-05-01 Apr-Jul Official 50% Forecast: 770 kaf (79% of average)
 ESP is Unregulated and No Precipitation Forecast Included



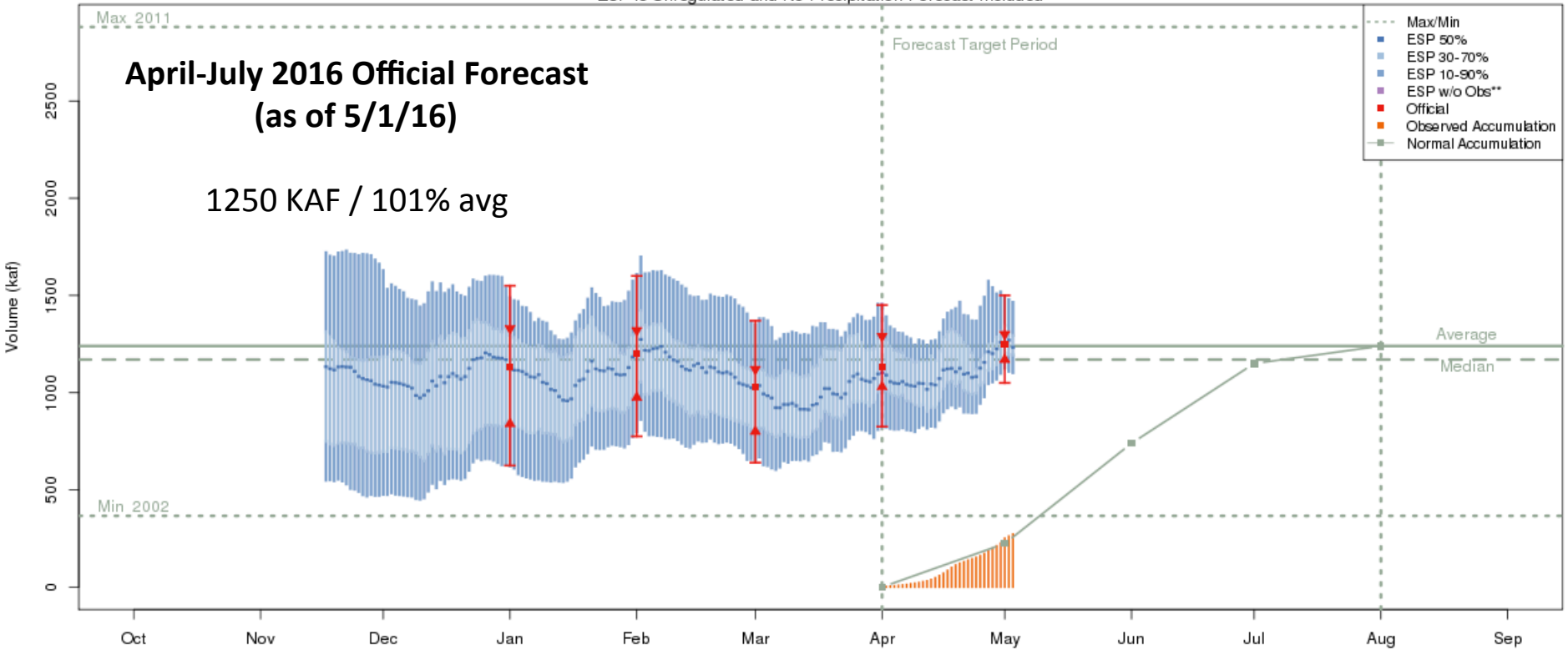
The latest (2016-05-03) 50% ESP forecast is 798 kaf.
 Plot Created 2016-05-03 15:58:44, NOAA / NWS / CBRFC
 Forecasts in the forecast target period include observed values.

Forecast Evolution Plot – Duchesne-Randlett



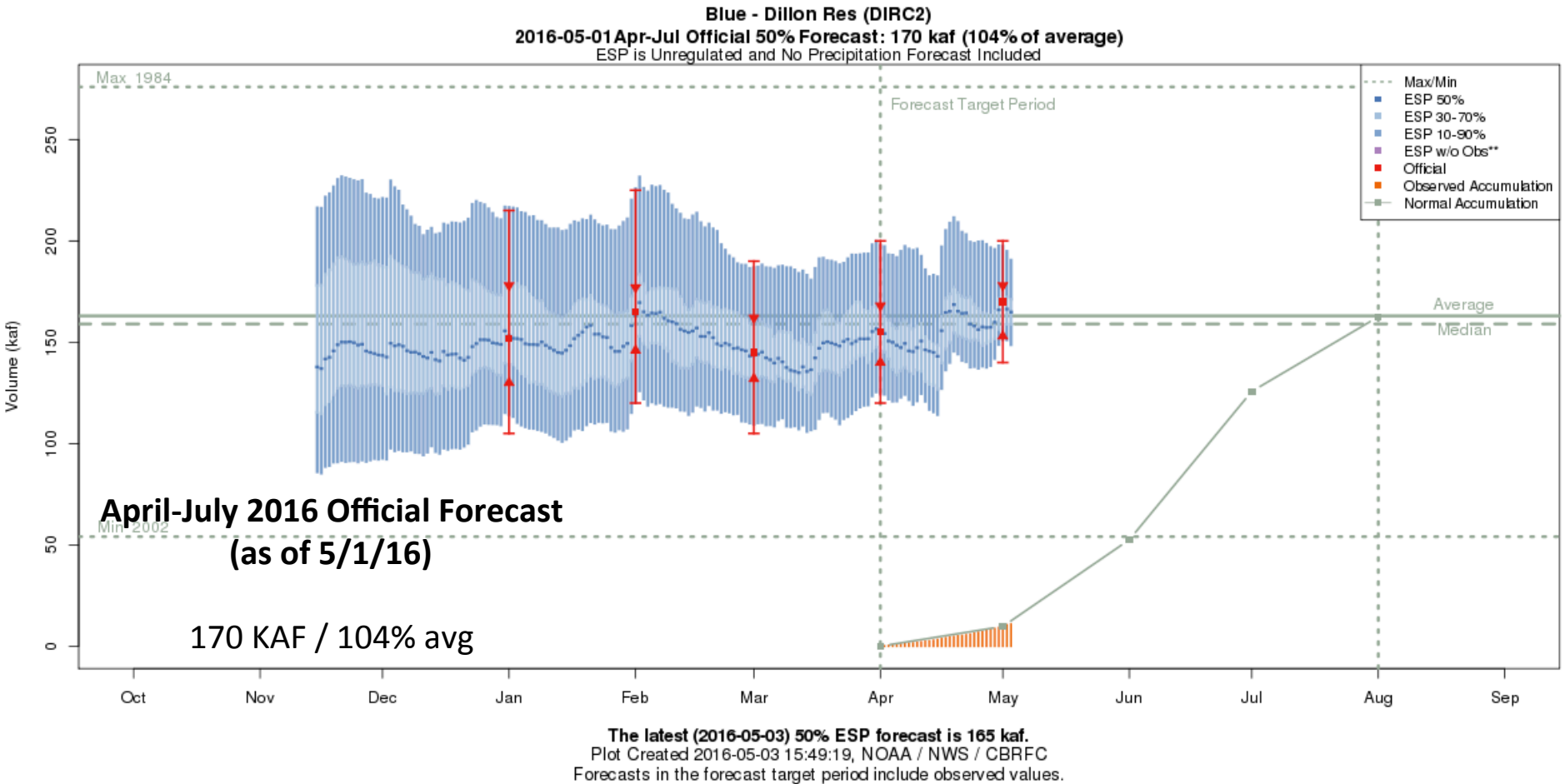
Forecast Evolution Plot – Yampa-Deerlodge

Yampa - Deerlodge Park (YDLC2)
2016-05-01 Apr-Jul Official 50% Forecast: 1250 kaf (101% of average)
ESP is Unregulated and No Precipitation Forecast Included



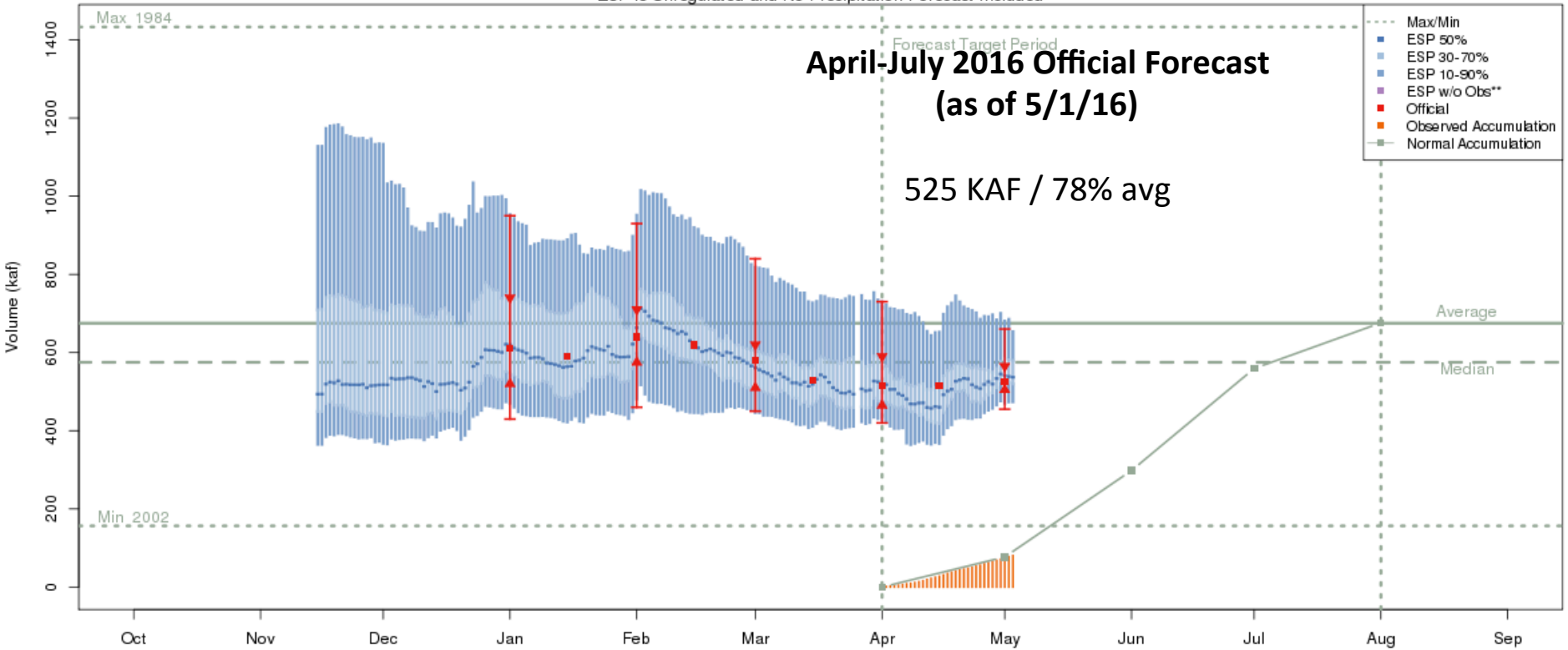
The latest (2016-05-03) 50% ESP forecast is 1233 kaf.
Plot Created 2016-05-03 16:30:40, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

Forecast Evolution Plot – Dillon Reservoir



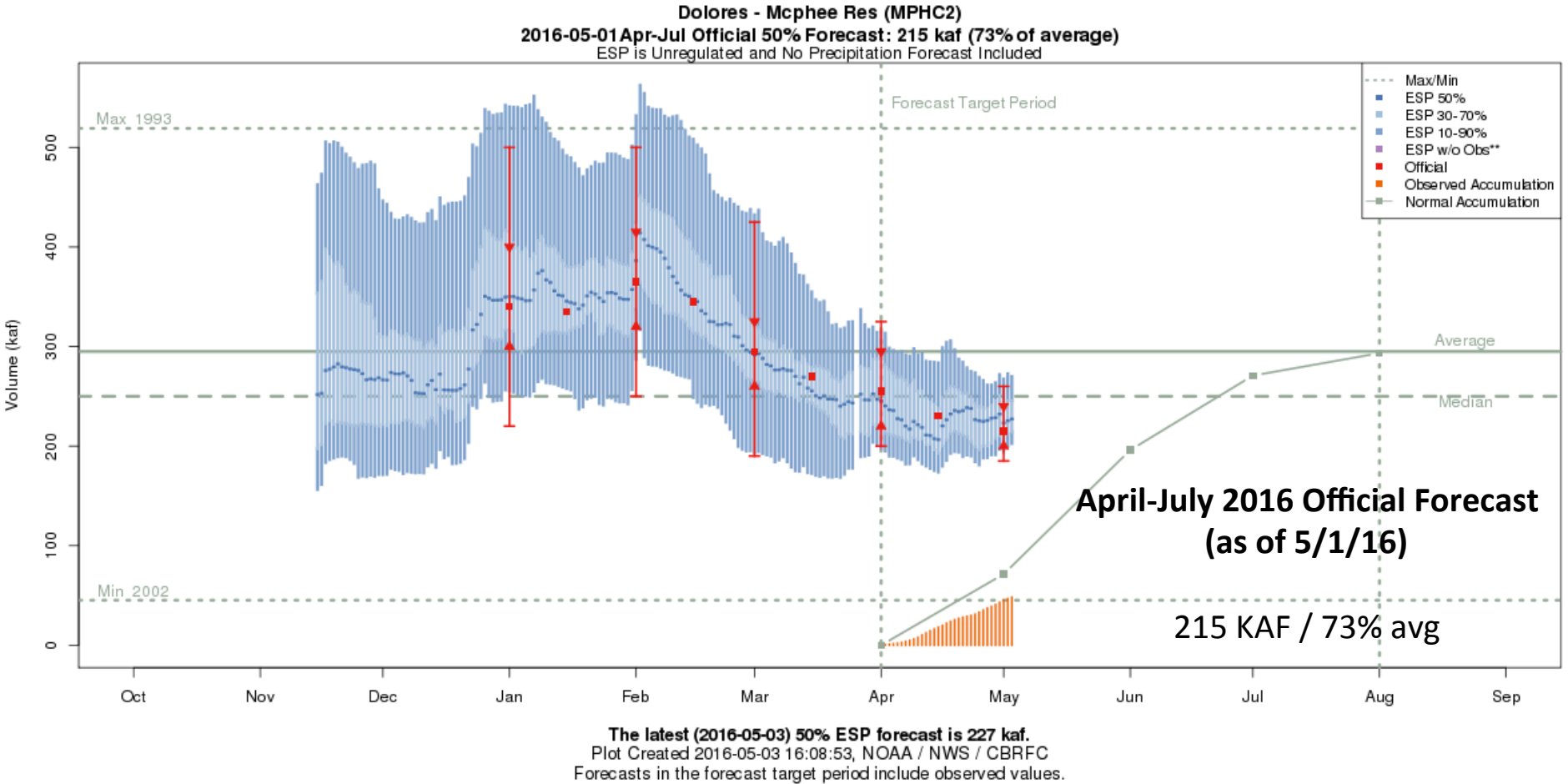
Forecast Evolution Plot – Blue Mesa Reservoir

Gunnison - Blue Mesa Res (BMDC2)
2016-05-01 Apr-Jul Official 50% Forecast: 525 kaf (78% of average)
ESP is Unregulated and No Precipitation Forecast Included



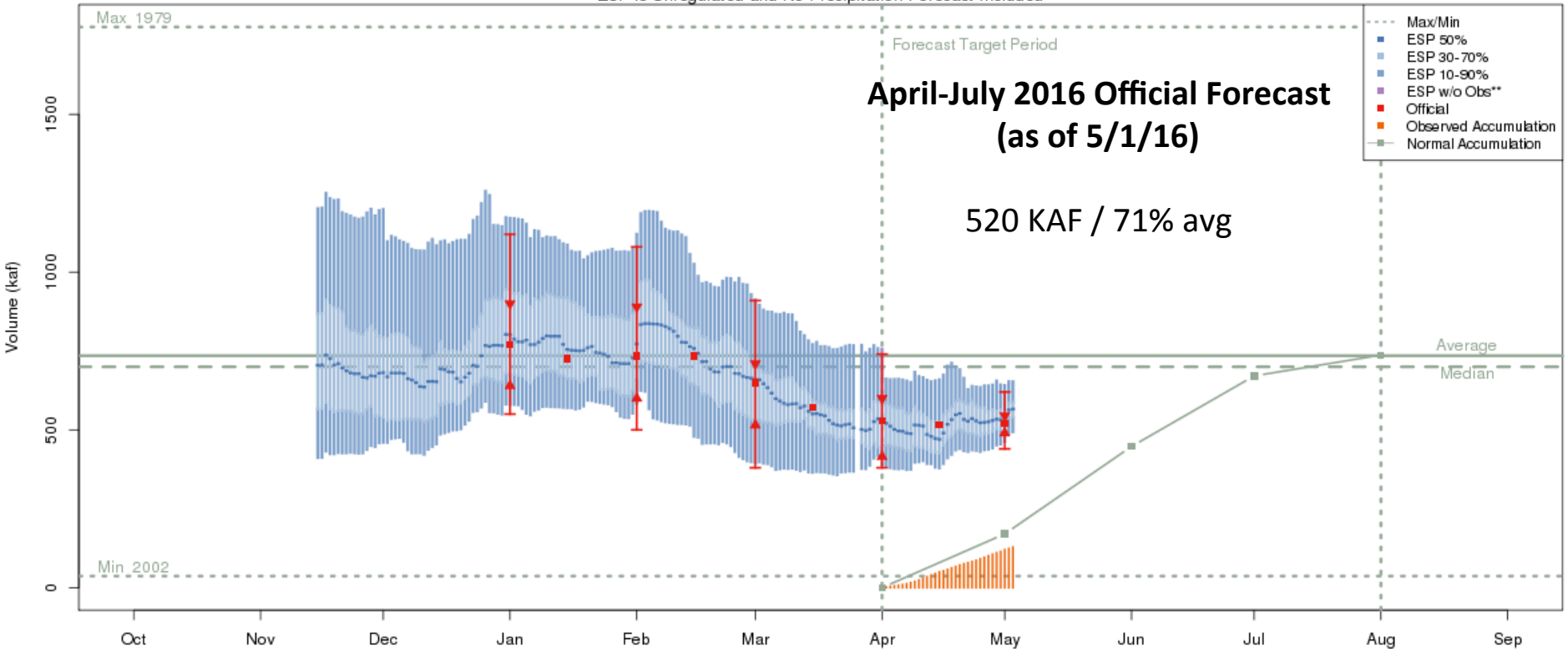
The latest (2016-05-03) 50% ESP forecast is 537 kaf.
Plot Created 2016-05-03 15:41:35, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

Forecast Evolution Plot – McPhee Reservoir



Forecast Evolution Plot – Navajo Reservoir

San Juan - Navajo Res- Archuleta- Nr (NVRN5)
2016-05-01 Apr-Jul Official 50% Forecast: 520 kaf (71% of average)
ESP is Unregulated and No Precipitation Forecast Included



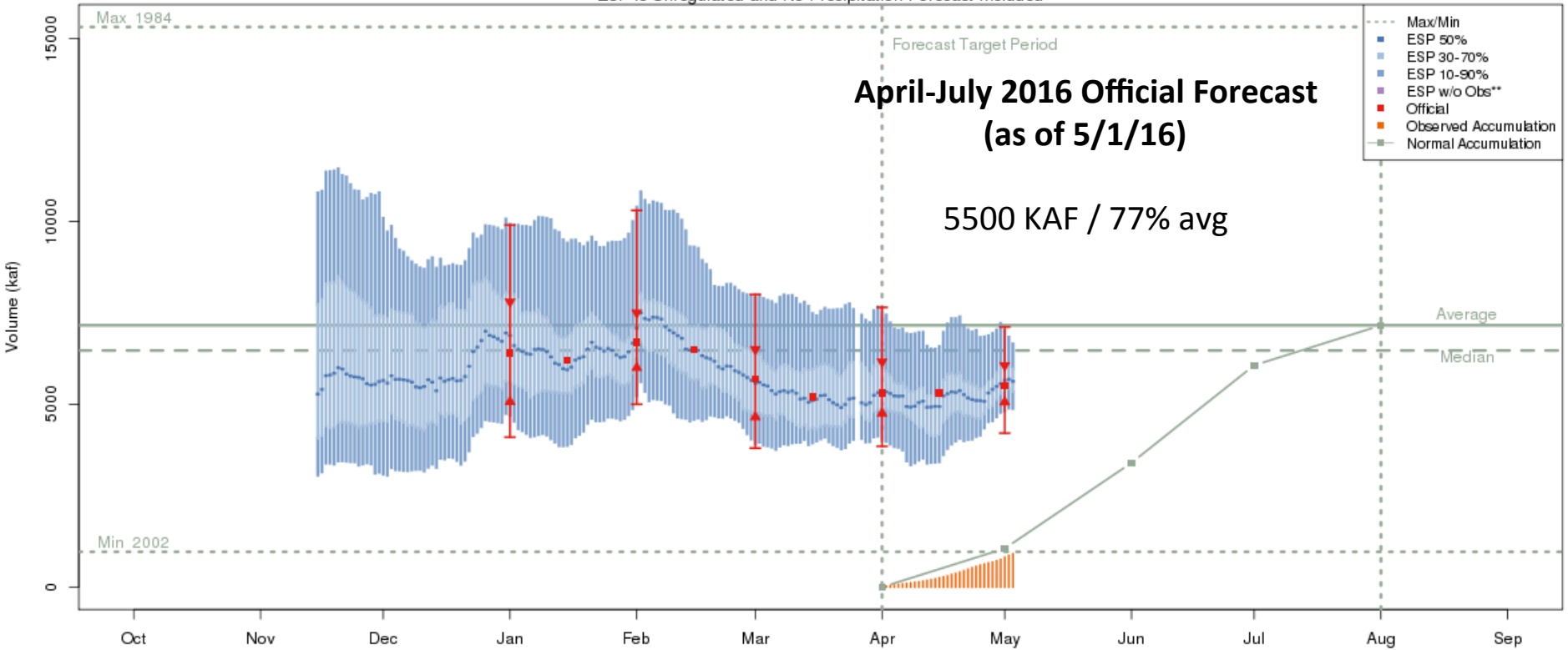
**April-July 2016 Official Forecast
(as of 5/1/16)**

520 KAF / 71% avg

The latest (2016-05-03) 50% ESP forecast is 566 kaf.
Plot Created 2016-05-03 16:10:33, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

Forecast Evolution Plot – Lake Powell

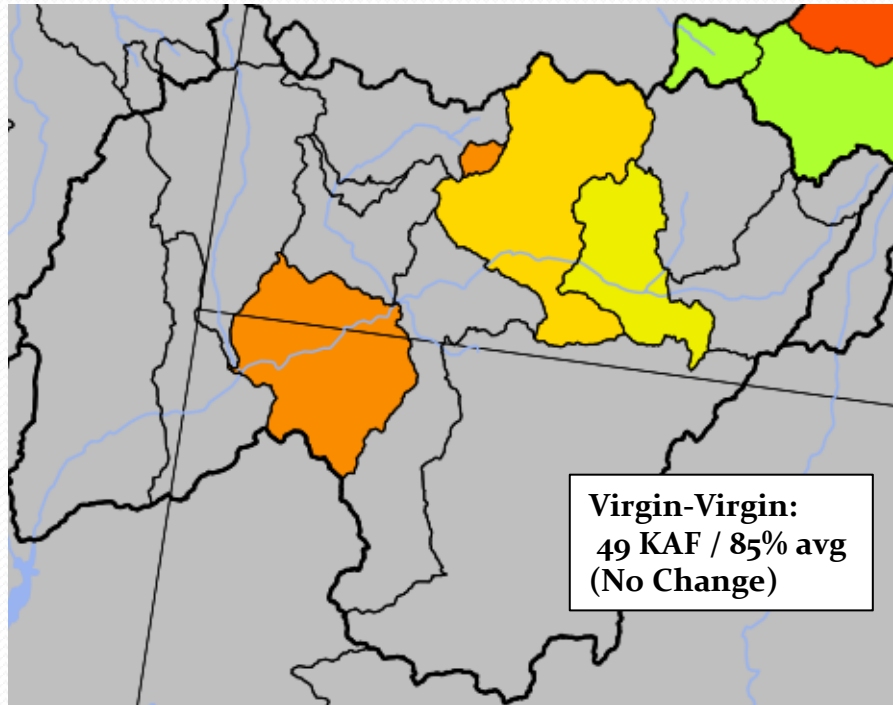
Colorado - Lake Powell- Glen Cyn Dam- At (GLDA3)
 2016-05-01 Apr-Jul Official 50% Forecast: 5500 kaf (77% of average)
 ESP is Unregulated and No Precipitation Forecast Included



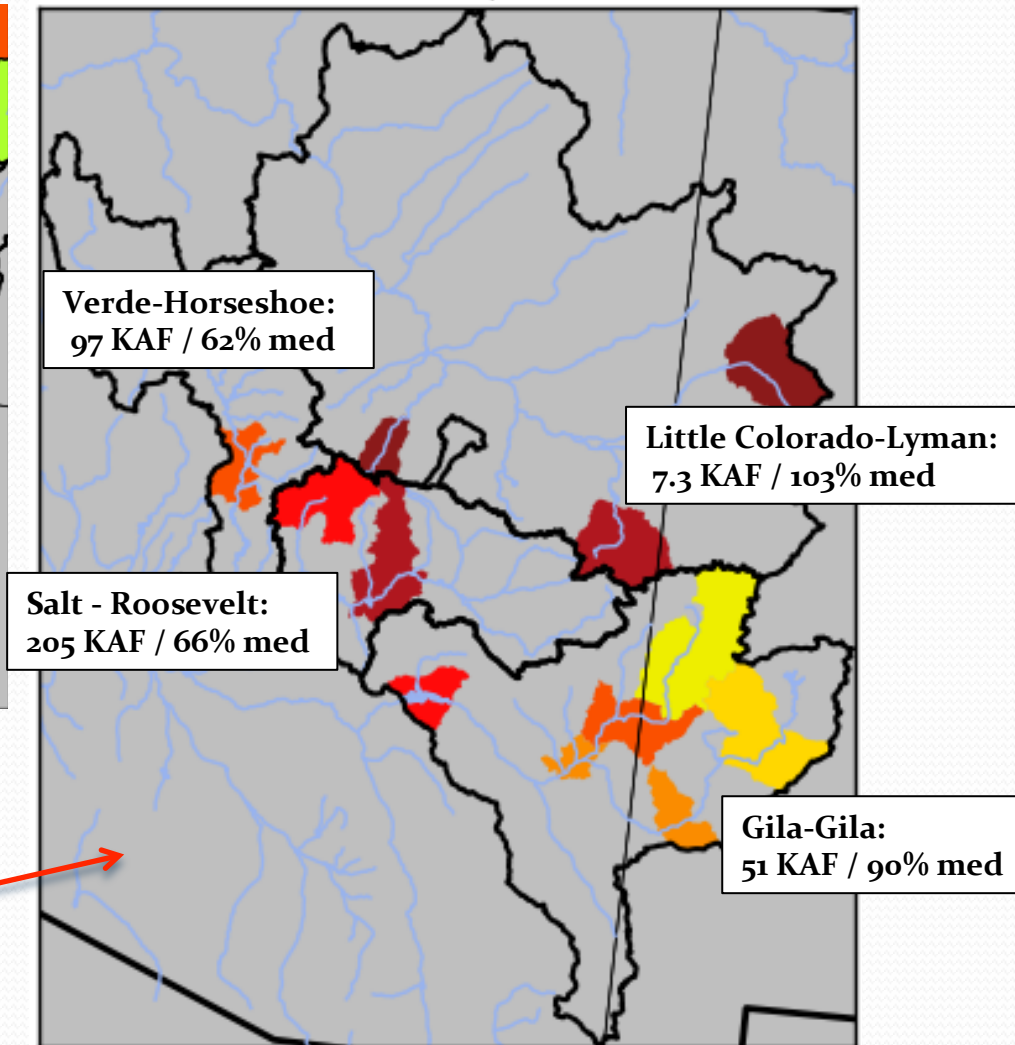
The latest (2016-05-03) 50% ESP forecast is 5626 kaf.
 Plot Created 2016-05-03 15:57:24, NOAA / NWS / CBRFC
 Forecasts in the forecast target period include observed values.

Lower Colorado Forecast Streamflow Volumes

Virgin River Basin
April-July Percent Average

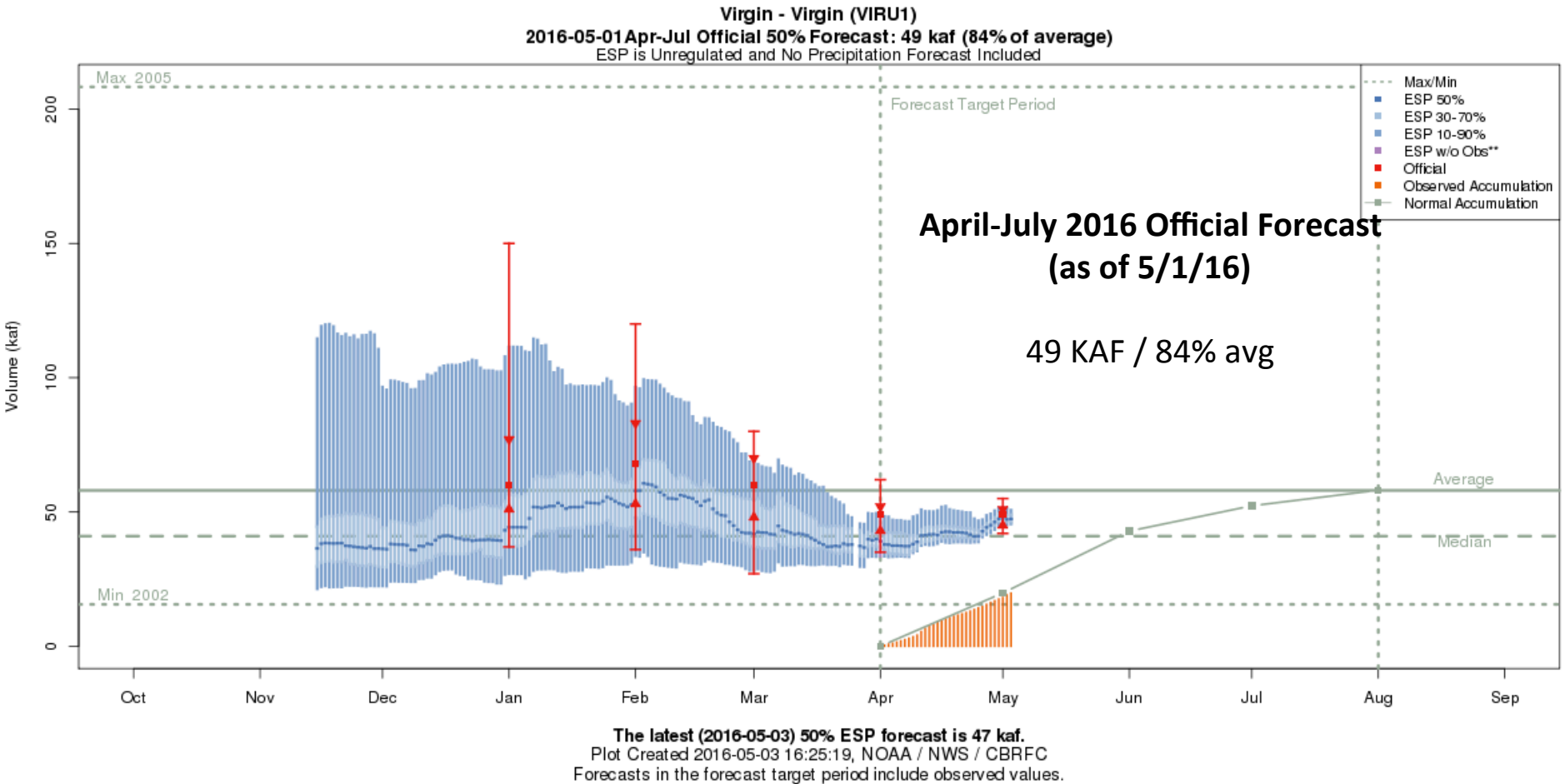


Arizona River Basins
(Little Colorado, Salt, Verde, Gila)
January-May Percent Median



No longer making forecasts for
Arizona River Basins this season.
These are from last month.

Forecast Evolution Plot – Virgin-Virgin



Forecast Impacts Summary

- April precipitation in the Northern and Northeastern portion of the Upper Colorado River Basin resulted in moderate increases in the Yampa, Upper Colorado, and Gunnison regions
- Dry conditions persisted in the Four Corners area, resulting in decreased forecasts in the San Juan and Dolores regions
- Snowpack generally improved as a percent of median in the Green, Yampa, and Colorado Headwater regions, particularly at higher elevations. Snowpack in the Southwest and Lower Colorado River Basin has basically melted out

IRI/CPC Probabilistic ENSO Outlook

Updated 21 April 2016

The chance of El Niño gradually decreases during the spring and ENSO-neutral is favored during May-June-July (MJJ) 2016. The chance of La Niña increases to more than 50% in August-September-October (ASO) 2016.

Mid-Apr IRI/CPC Model-Based Probabilistic ENSO Forecast

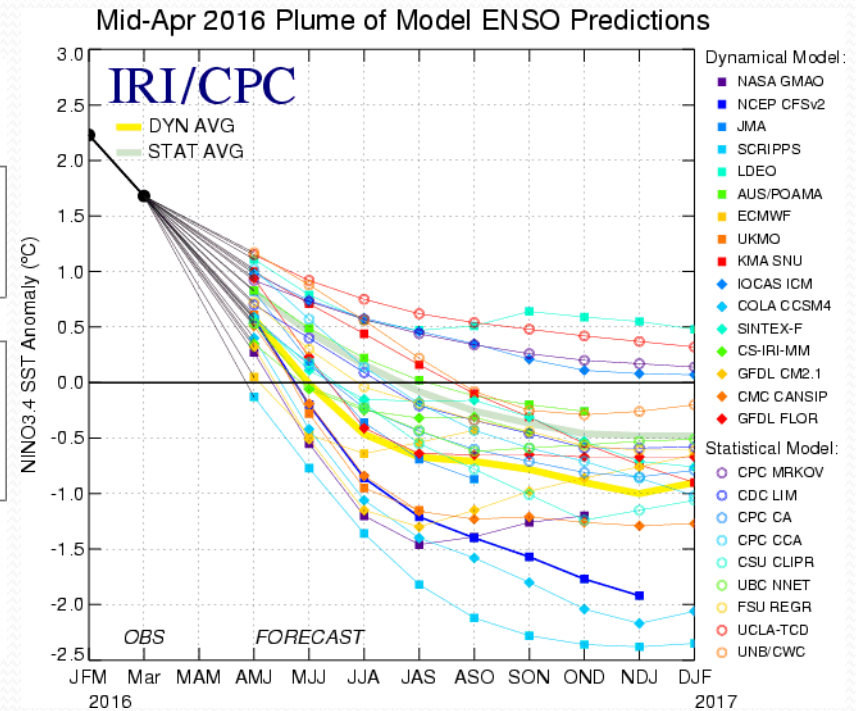
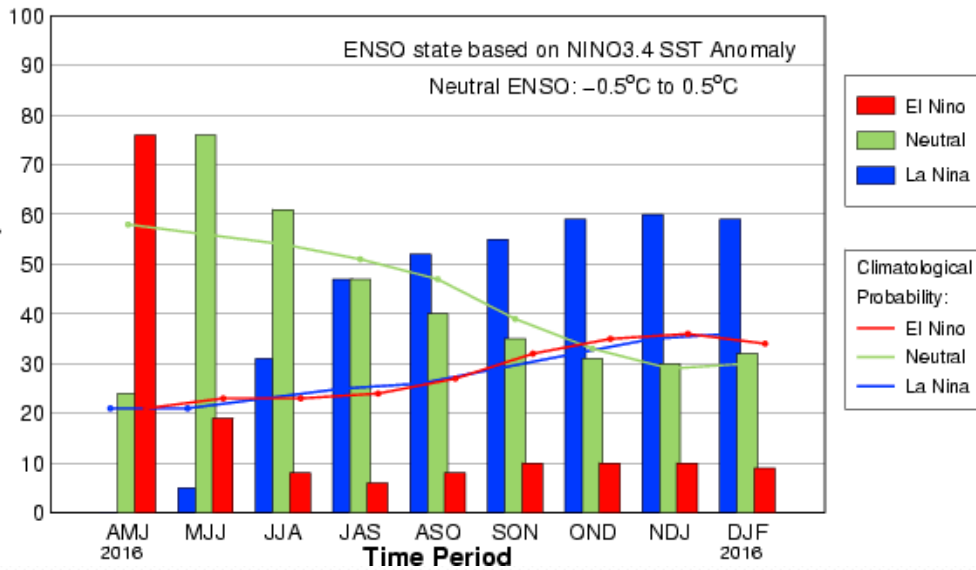


Figure provided by the International Research Institute (IRI) for Climate and Society

What about La Niña?

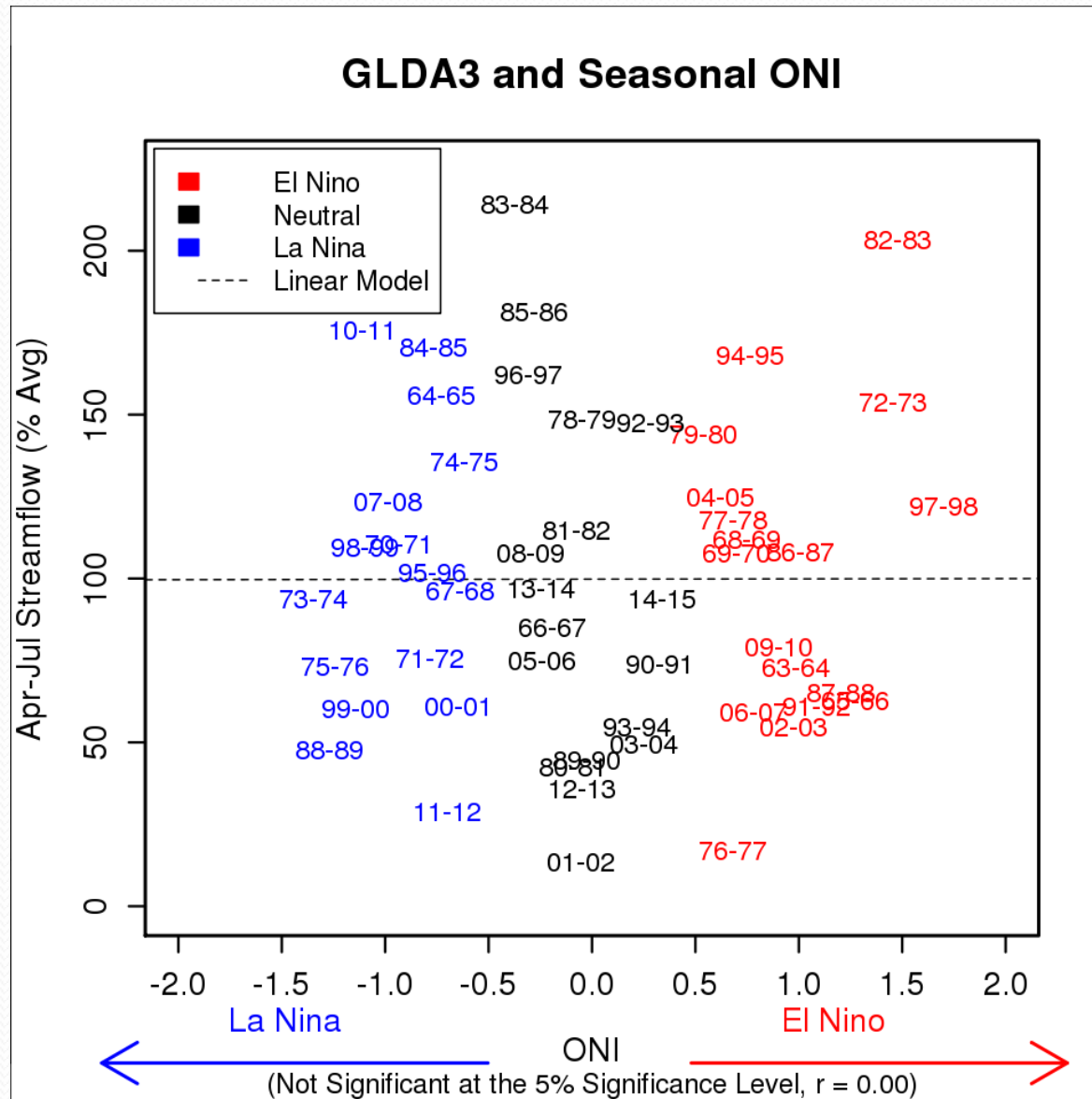
Moderate El Niño Years

El Niño Year	Average ONI (Aug-Mar)	Average ONI one year later
57-58	1.41	.53
63-64	1.02	-.65
65-66	1.49	-.22
87-88	1.09	-1.51
91-92	1.19	.03
02-03	1.02	.31
09-10	1.10	-1.29
Average	1.19	-.40

Strong El Niño Years

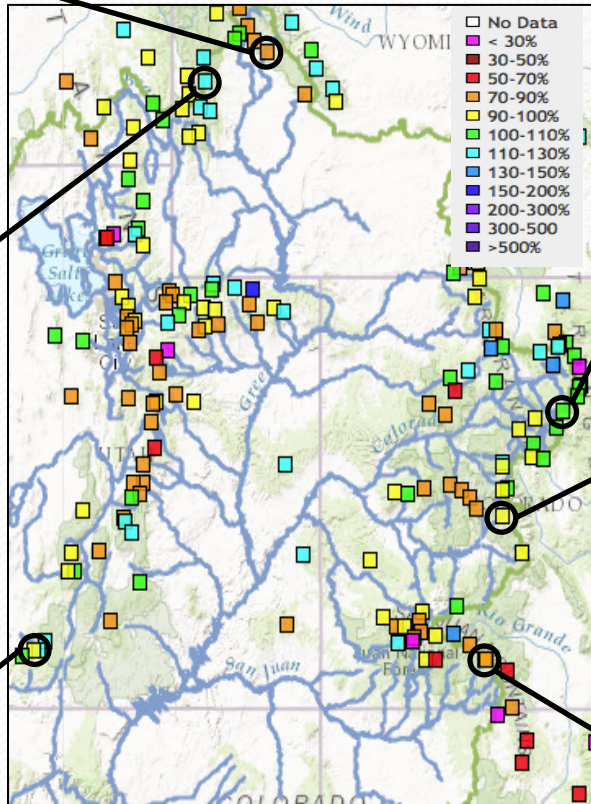
El Niño Year	Average ONI (Aug-Mar)	Average ONI one year later
72-73	1.66	-1.67
82-83	1.90	-.55
97-98	2.10	-1.30
15-16	2.08	???
Average	1.89	-1.17

What about La Niña?

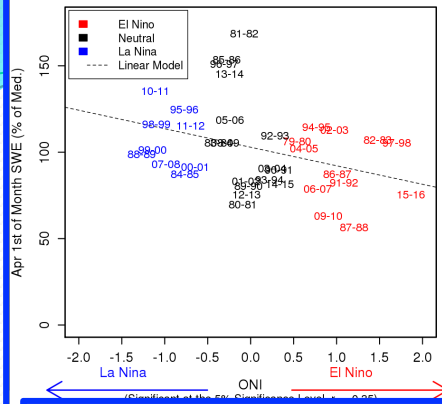


Snow and ENSO (ENSnow?)

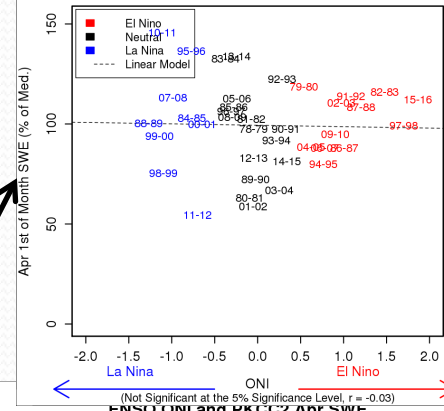
April 1 SWE (% median)



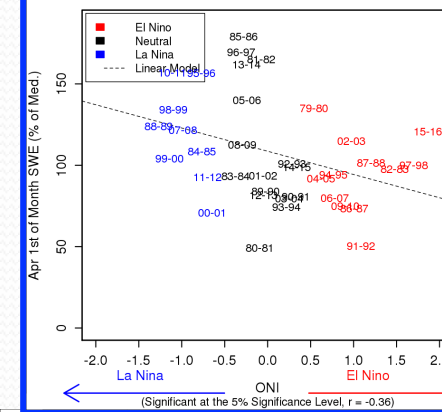
ENSO ONI and EKPW4 Apr SWE



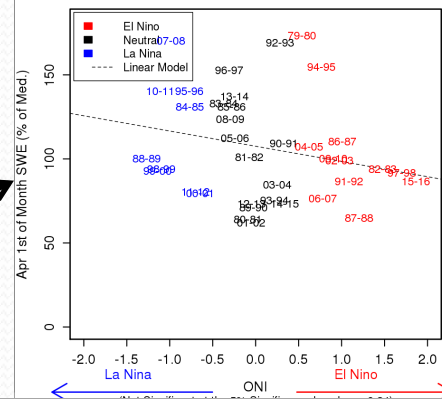
ENSO ONI and BTSC2 Apr SWE



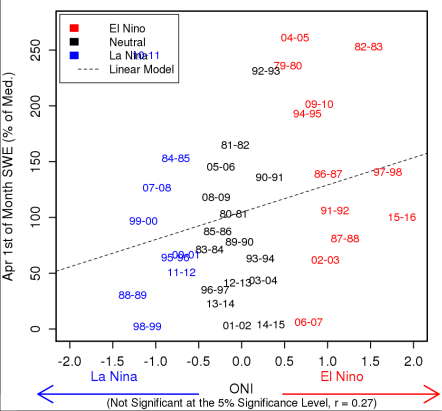
ENSO ONI and TRPW4 Apr SWE



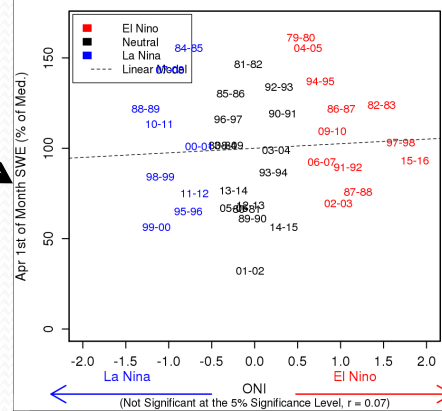
ENSO ONI and PKCC2 Apr SWE



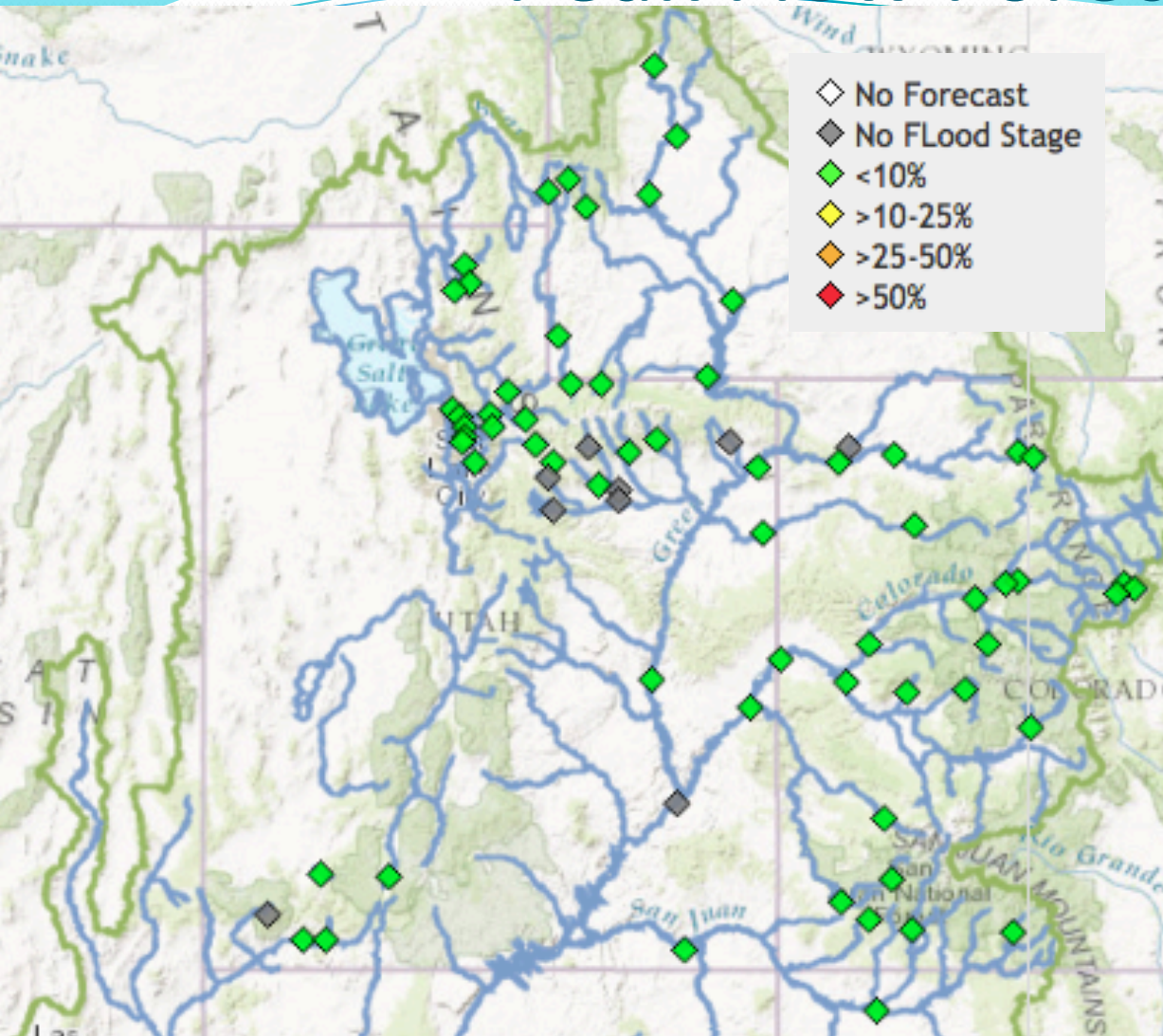
ENSO ONI and WFLU1 Apr SWE



ENSO ONI and WCSC2 Apr SWE



Peak Flow Forecasts



No site is currently forecast to exceed flood stage **due to snowmelt** at this time.

Forecasts and/or flood levels do not exist on every stream.

Spring weather, such as extended periods of much above normal temperatures or heavy rainfall during melt, can cause flooding problems in any year.

From CBRFC homepage (www.cbrfc.noaa.gov):

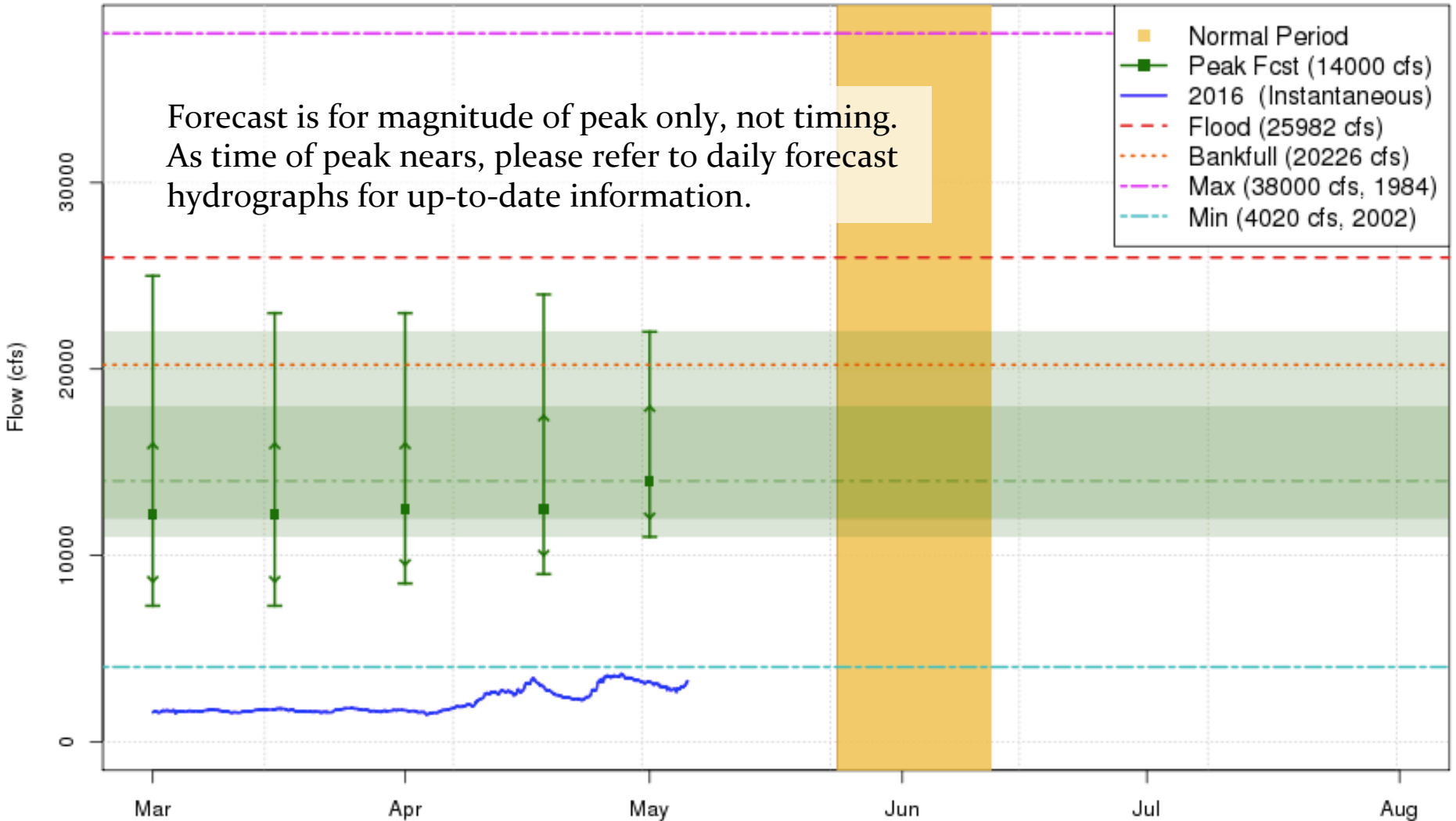
- > “Rivers” drop down menu
- > select Peak Flow Map or List

map: <http://www.cbrfc.noaa.gov/lmap/lmap.php?interface=peak>

list: <http://www.cbrfc.noaa.gov/rmap/peak/peaklist.php>

Peak Flow Forecasts

2016 Mean Daily Peak Flow Forecast
Colorado - Cameo- Nr (CAMC2)

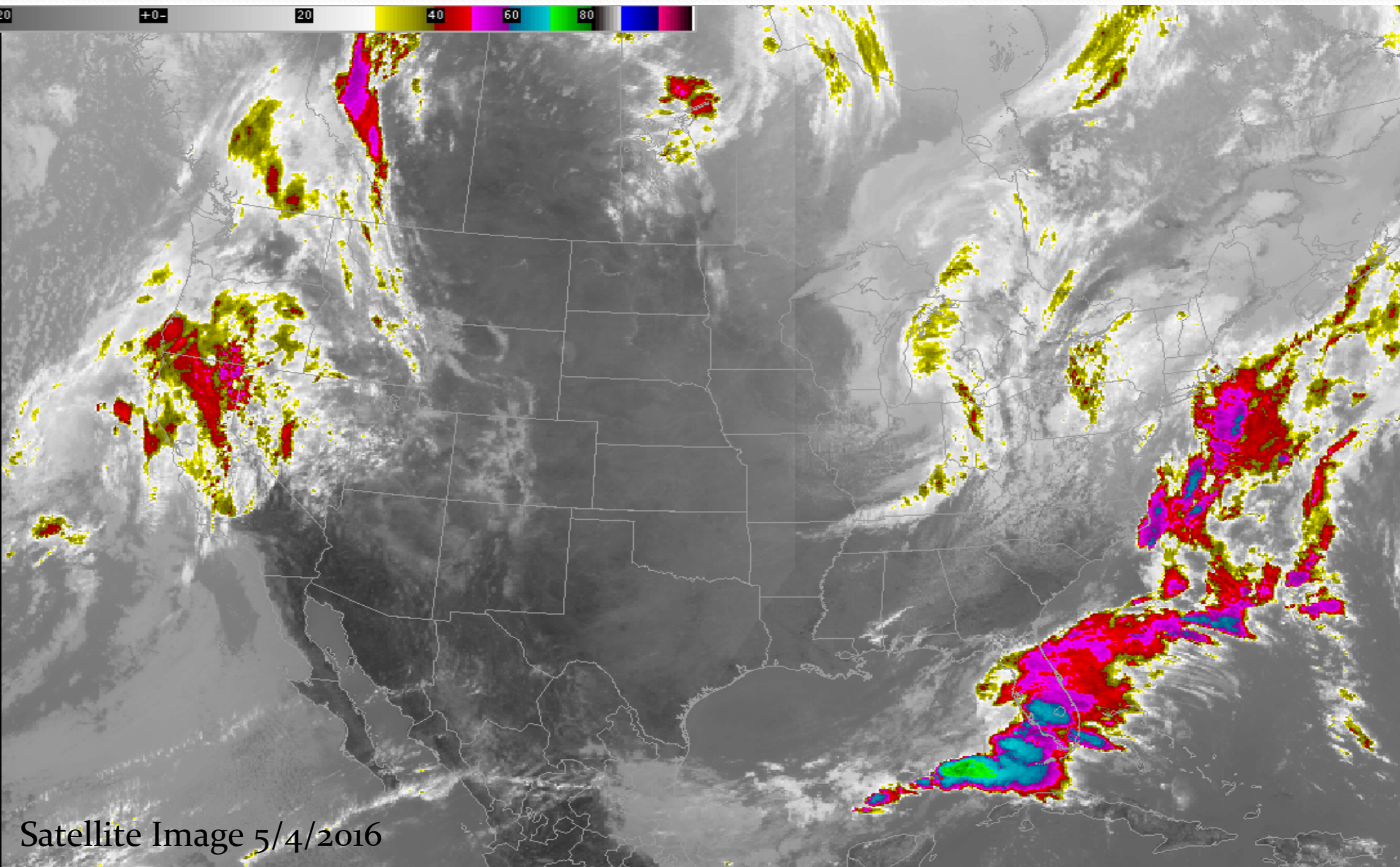


These graphics are updated approximately every two weeks between 3/1 and 5/1

Plot Created 2016-05-05 11:33:14
CBRFC / NWS / NOAA

Upcoming Weather – A wet weekend ahead?

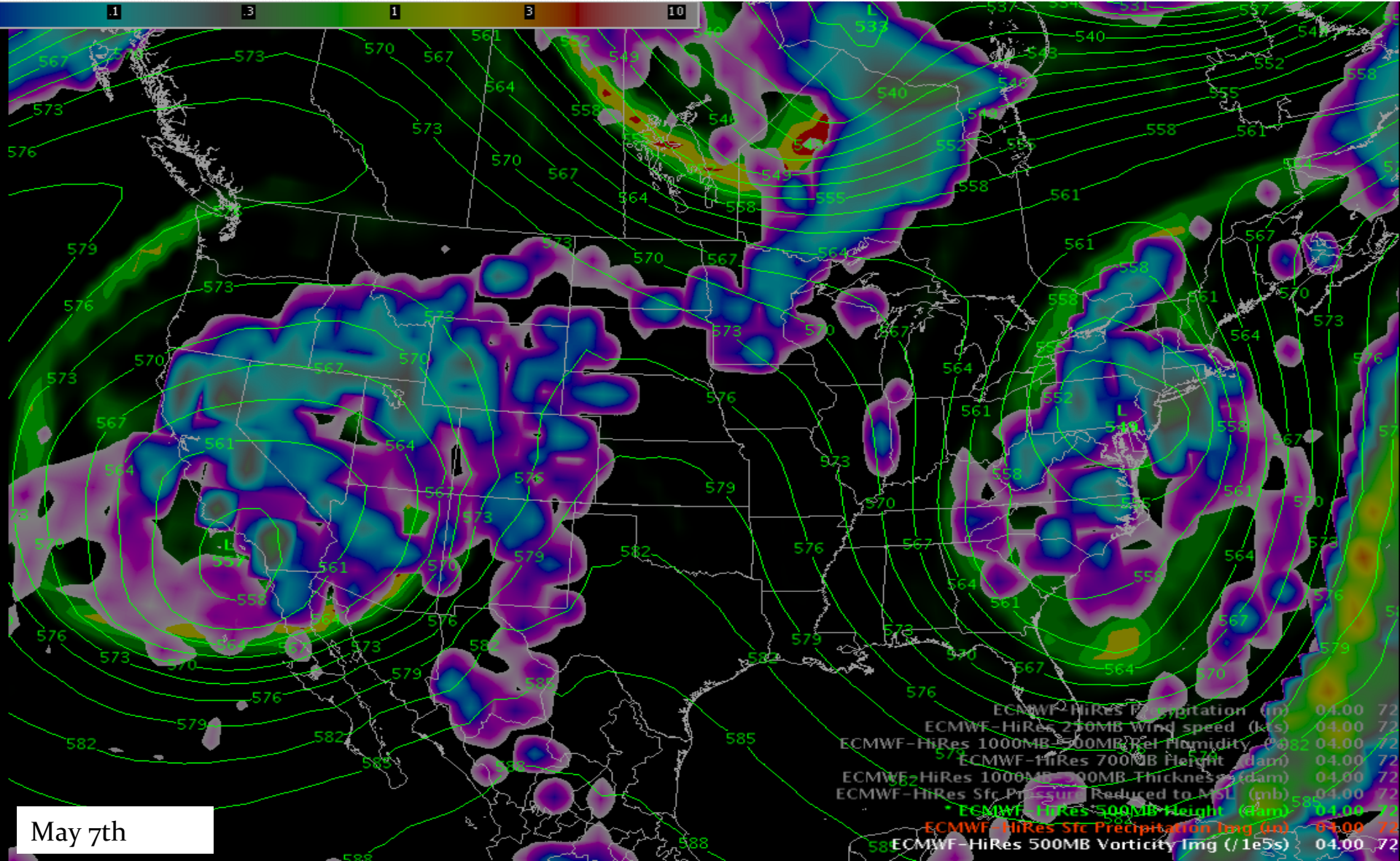
Dry and warm conditions will be prevalent until Friday, when a closed low will settle over the area and potentially bring precipitation to much of the CBRFC region.



Satellite Image 5/4/2016

Weather outlook

Closed low could bring precipitation over much of the CBRFC region this weekend.

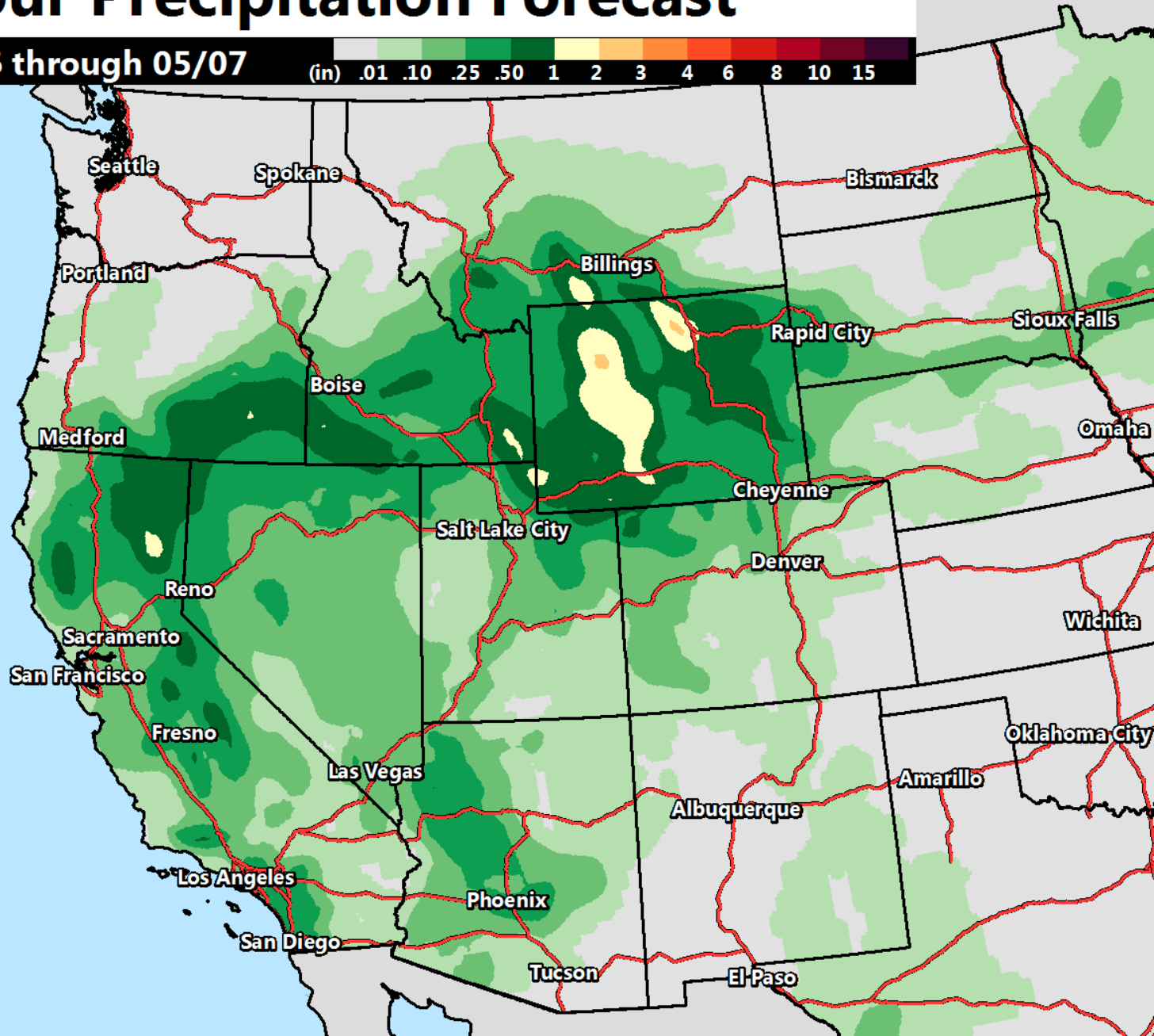




24-Hour Precipitation Forecast

5AM 05/06 through 05/07

(in) .01 .10 .25 .50 1 2 3 4 6 8 10 15



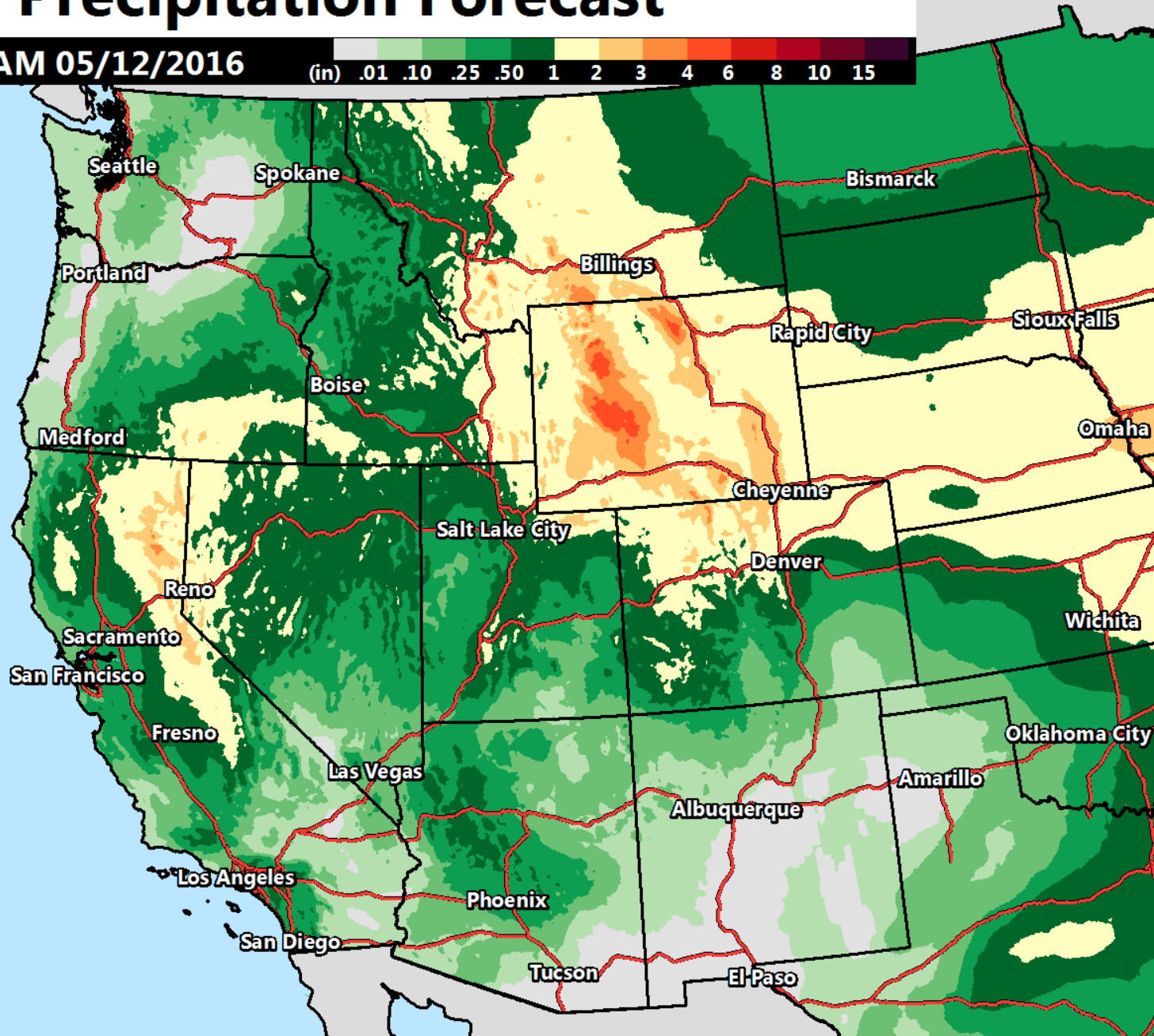
May 5, 2016 Forecast



7-Day Precipitation Forecast

Through 5AM 05/12/2016

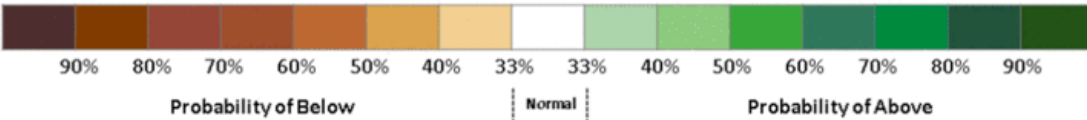
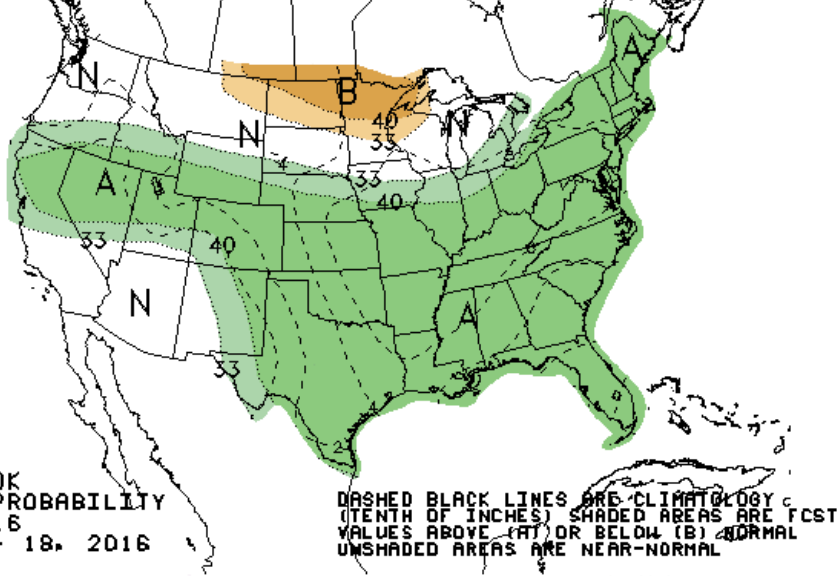
(in) .01 .10 .25 .50 1 2 3 4 6 8 10 15



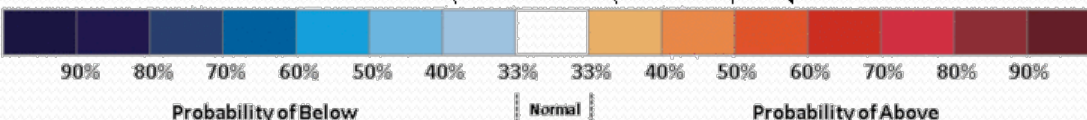
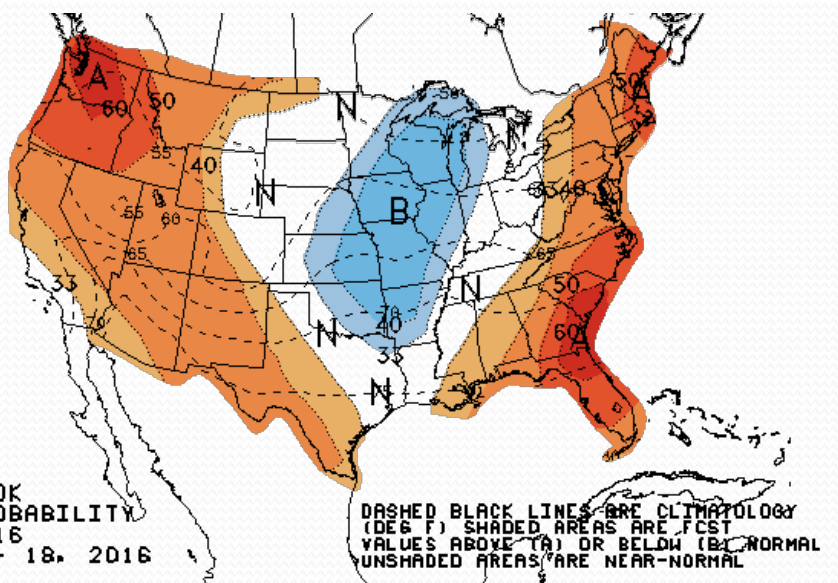
May 5, 2016 Forecast



8-14 DAY OUTLOOK
PRECIPITATION PROBABILITY
MADE 4 MAY 2016
VALID MAY 12 - 18, 2016



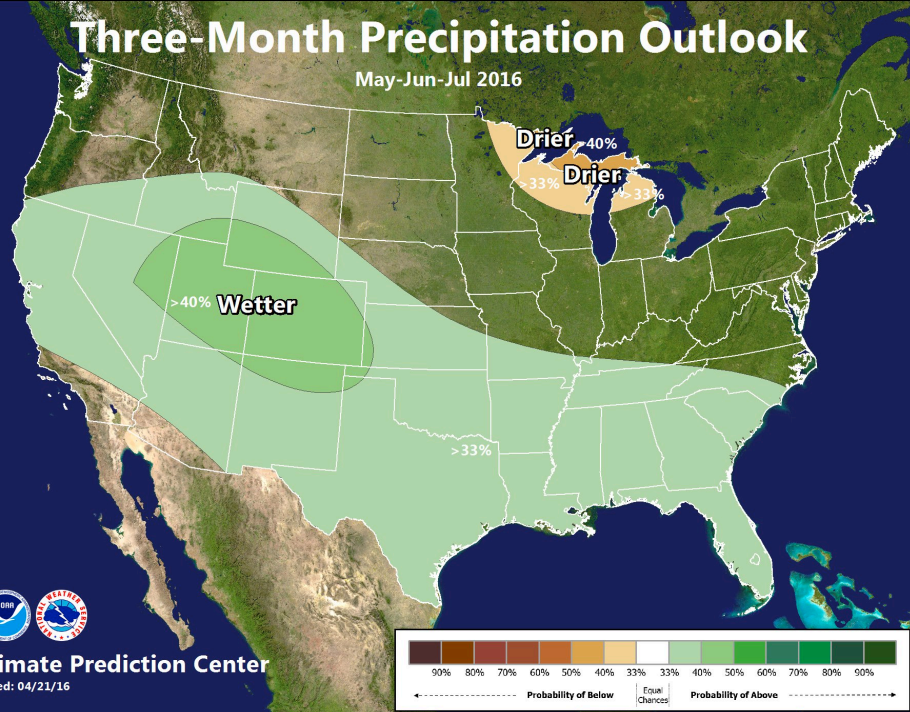
8-14 DAY OUTLOOK
TEMPERATURE PROBABILITY
MADE 4 MAY 2016
VALID MAY 12 - 18, 2016



Climate Prediction Center is showing increased chances for warmer and wetter conditions in our region over the next 8-14 days.

Three-Month Precipitation Outlook

May-Jun-Jul 2016



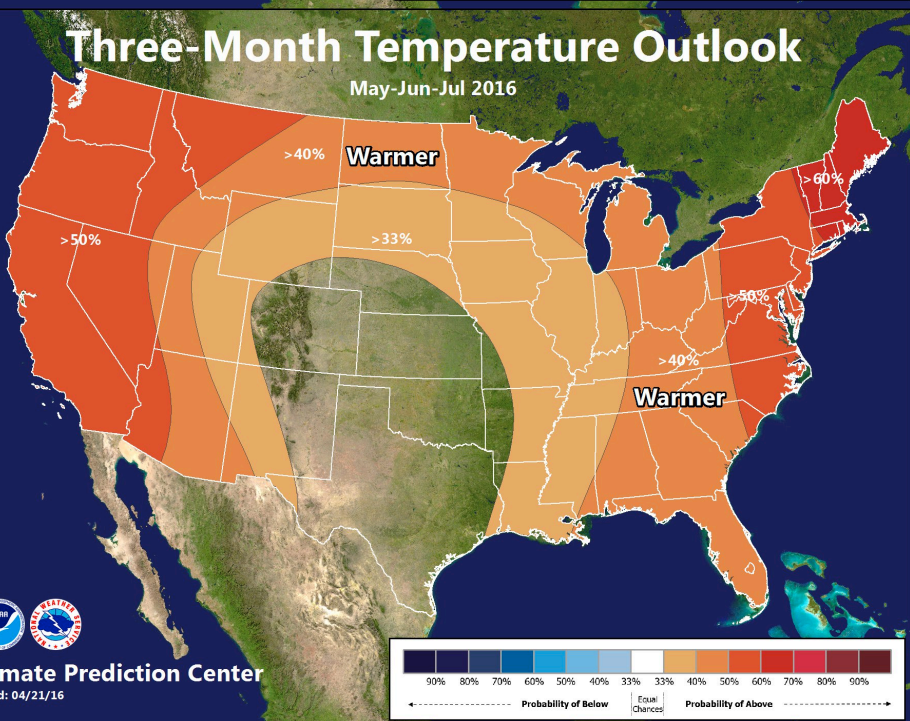
Climate Prediction Center

Issued: 04/21/16

Climate Prediction Center is showing increased chances for wetter, warmer conditions over the next 3 months.

Three-Month Temperature Outlook

May-Jun-Jul 2016

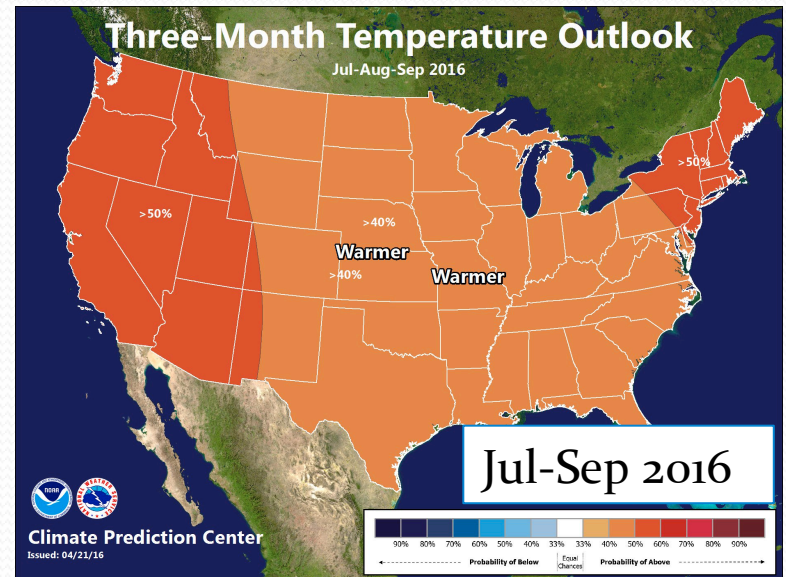
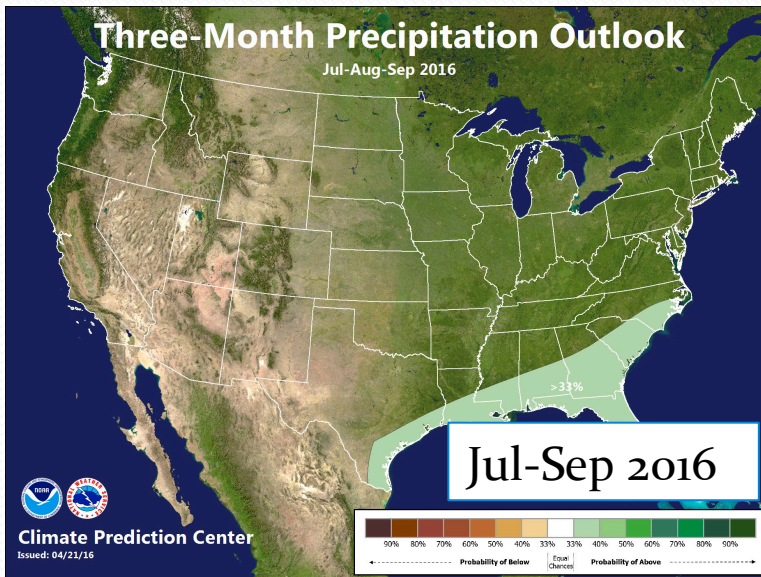
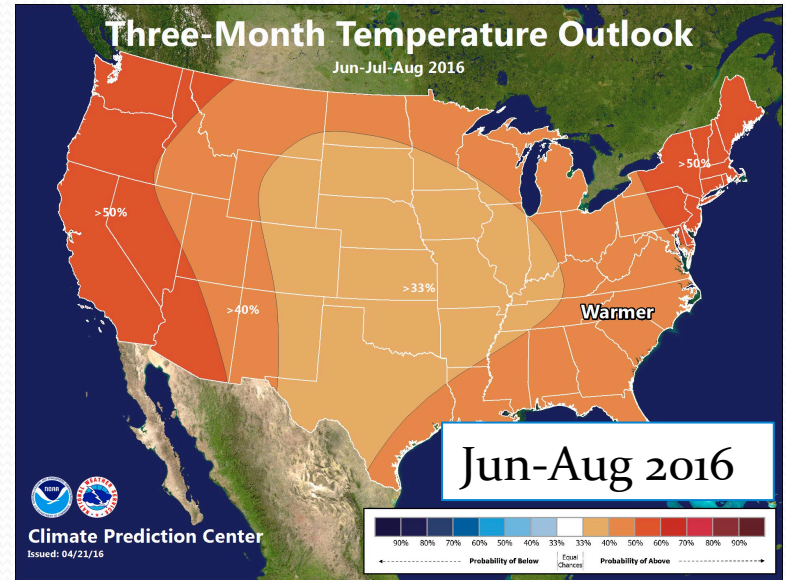
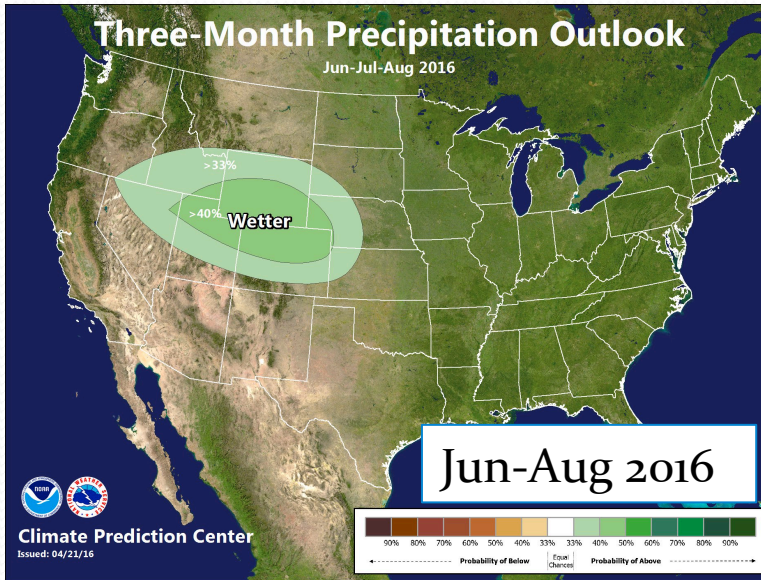


Climate Prediction Center

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Long Range Outlook

Climate Prediction Center – 3 month outlooks



Rest of the season...

- Unless there's a want for it, or another unusual May, we do not have any future Colorado Water Supply webinars scheduled, but definitely let us know if you need anything!
- Great Basin Webinar May 6th (tomorrow!) at 10 a.m. Mountain

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