

CBRFC 2015 Runoff Recap: Flaming Gorge Reservoir

August 27, 2015

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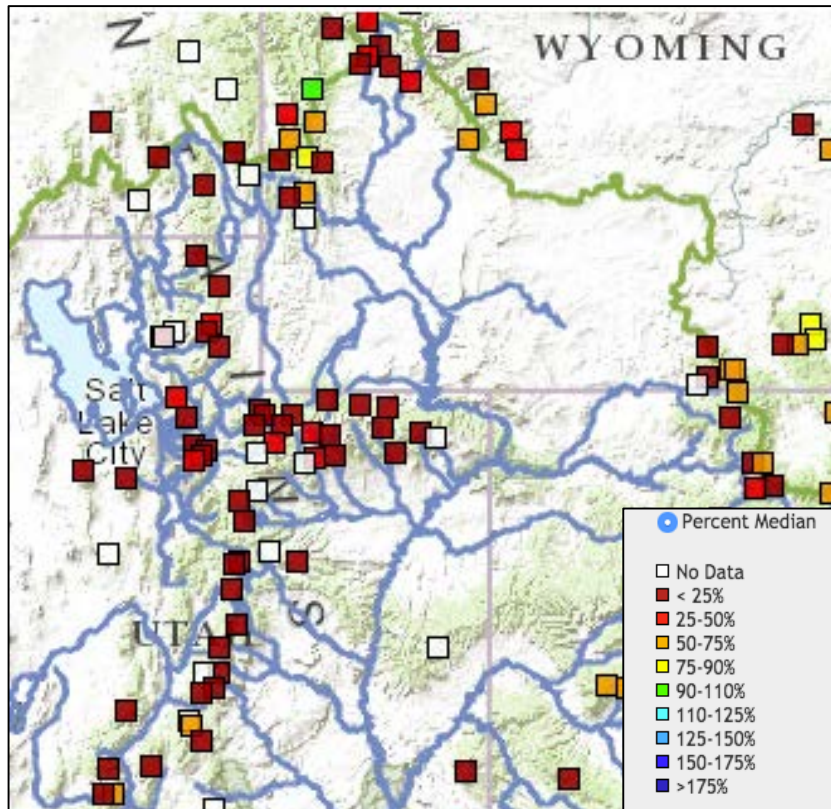
NWS Colorado Basin River Forecast Center



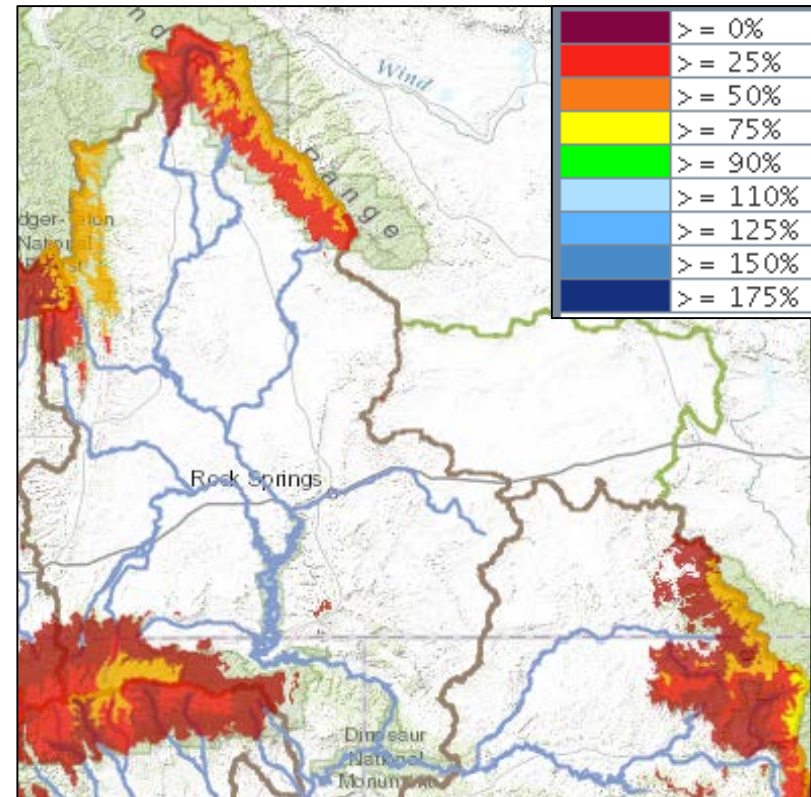
Looking Back – Snapshot on May 1st 2015

- Below average precipitation January- April
- Record warm winter in many areas
- Early snowmelt at low and middle elevations
- Dismal snowpack conditions
- Forecast Inflow for Flaming Gorge was 570 KAF (58% of average)
- Forecast for Yampa-Deerlodge was 620 KAF (50% of average)
- Stage set for sub-par runoff with below average volumes

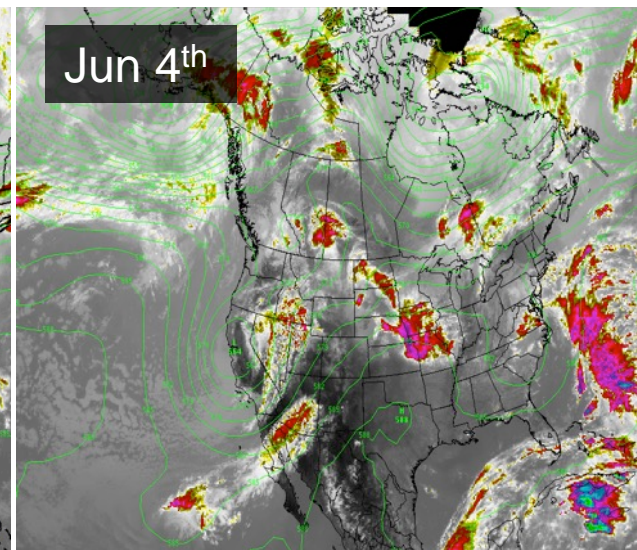
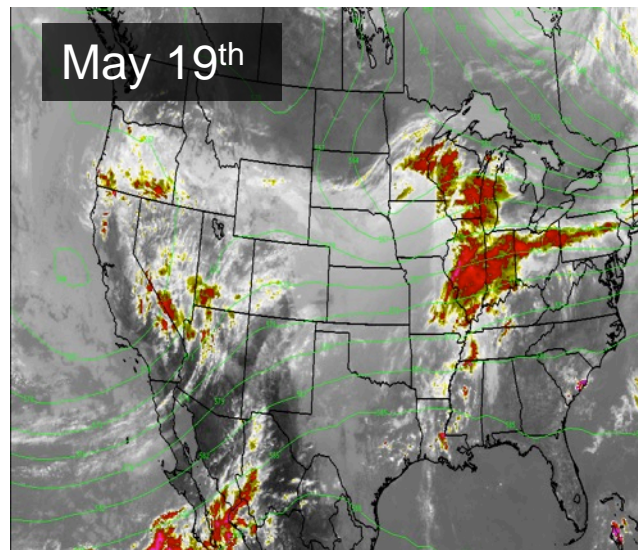
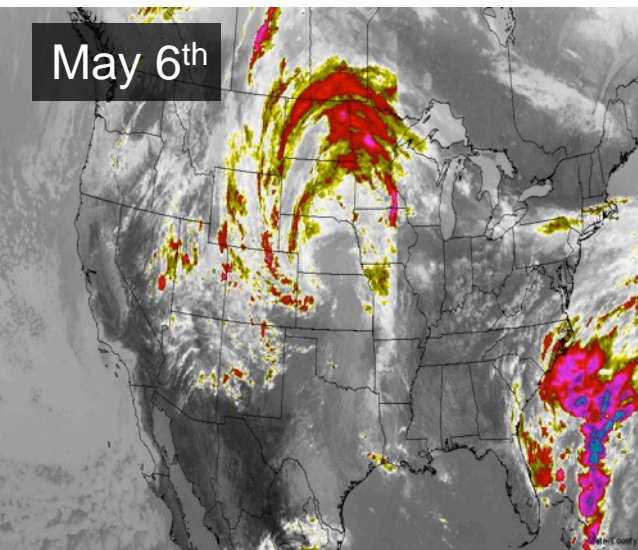
Snow Water Equivalent: May 1



Model Snow: May 1



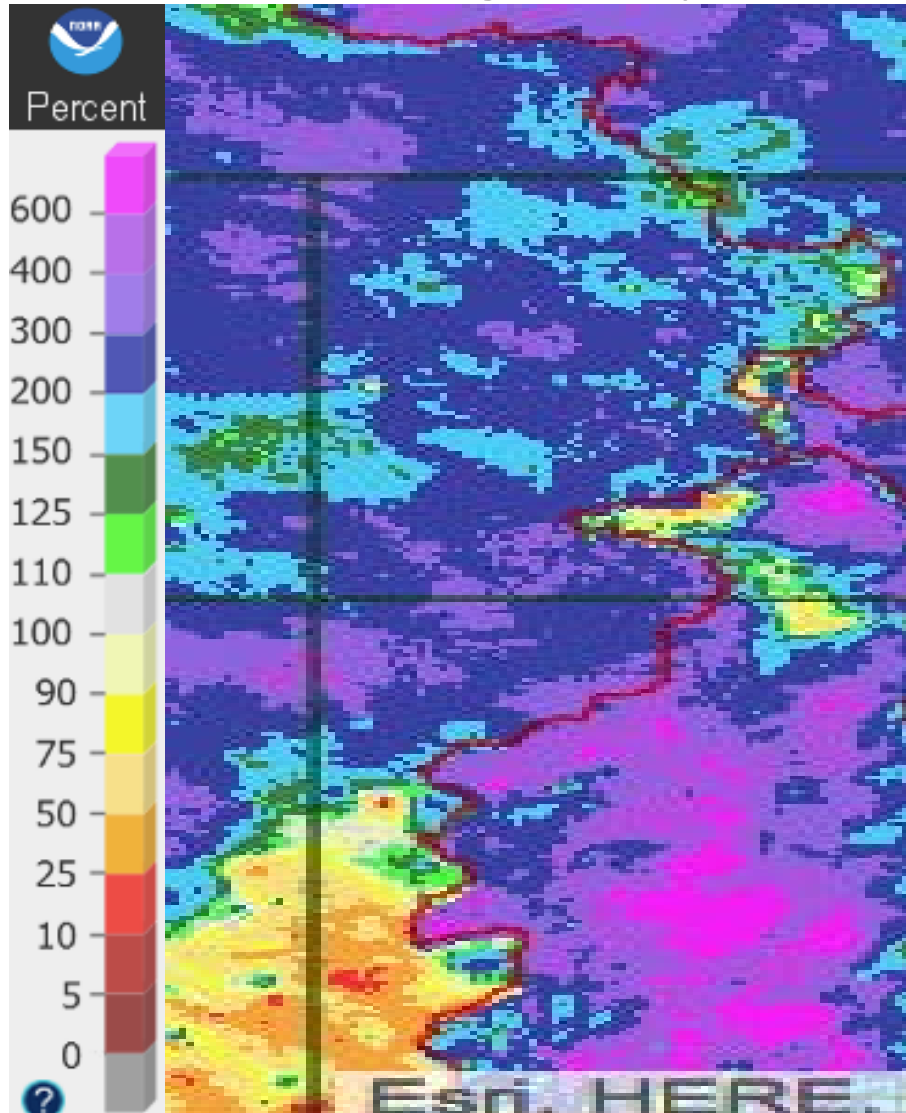
A change in the weather



- Pattern started to change in mid April & carried into early June.
- Frequent moist storms systems
- Much below average temperatures May into early June.
- Moisture tropical in nature with significant precipitation.
- Impacted by Hurricane Andres

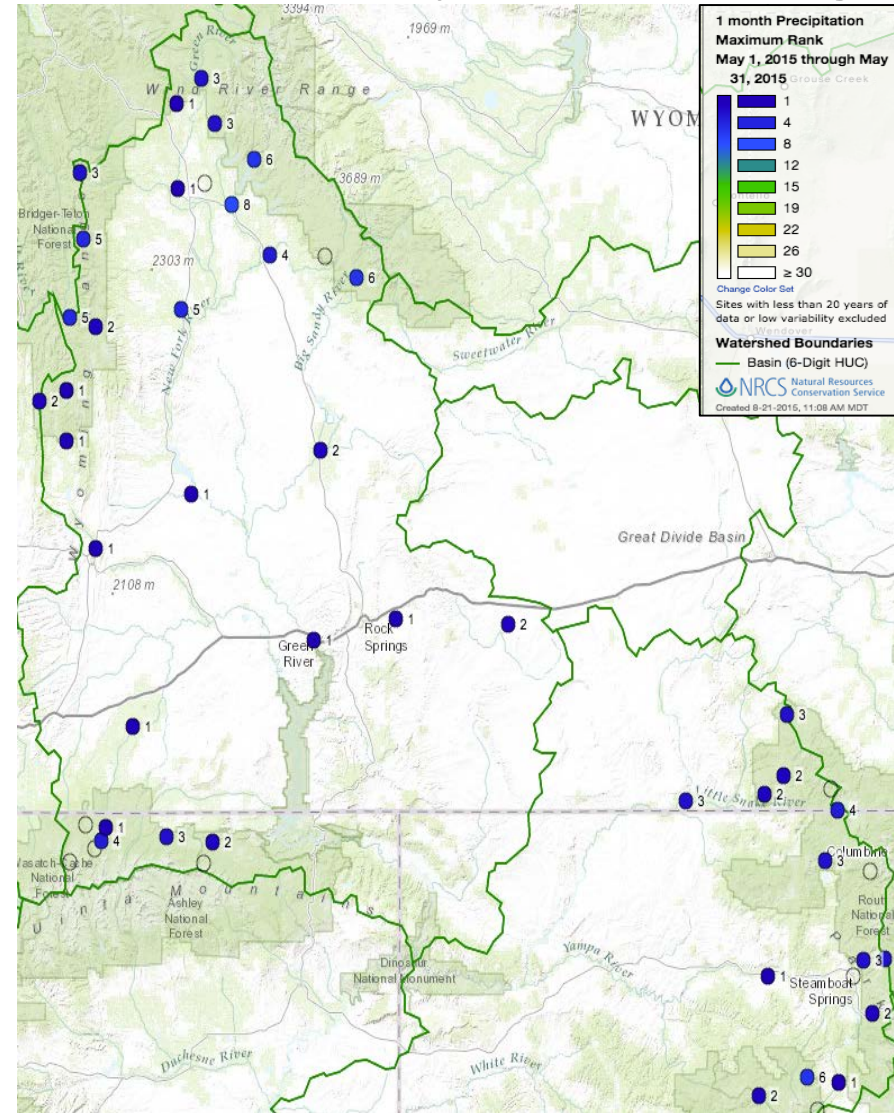
May Precipitation

Percent of Average Precipitation



Flaming Gorge: 250 % of average
Yampa: 230 % of average

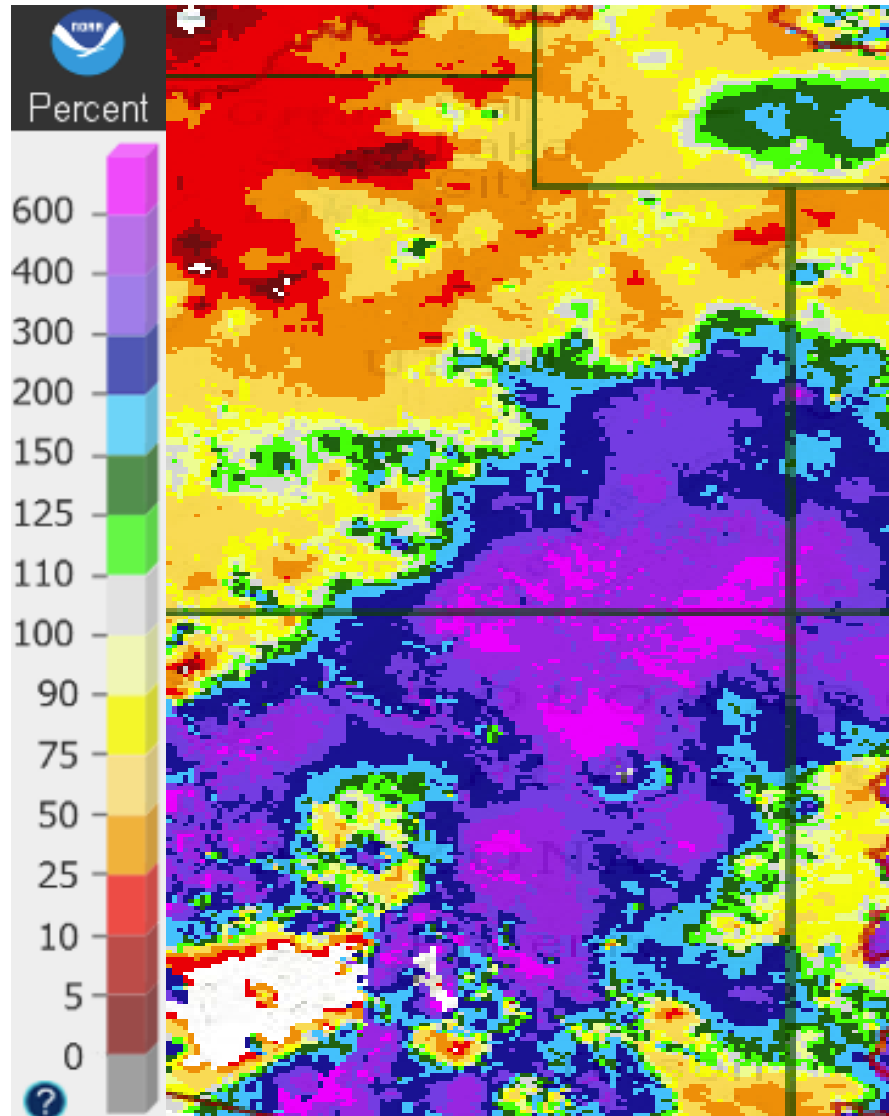
Historical Precipitation Ranking



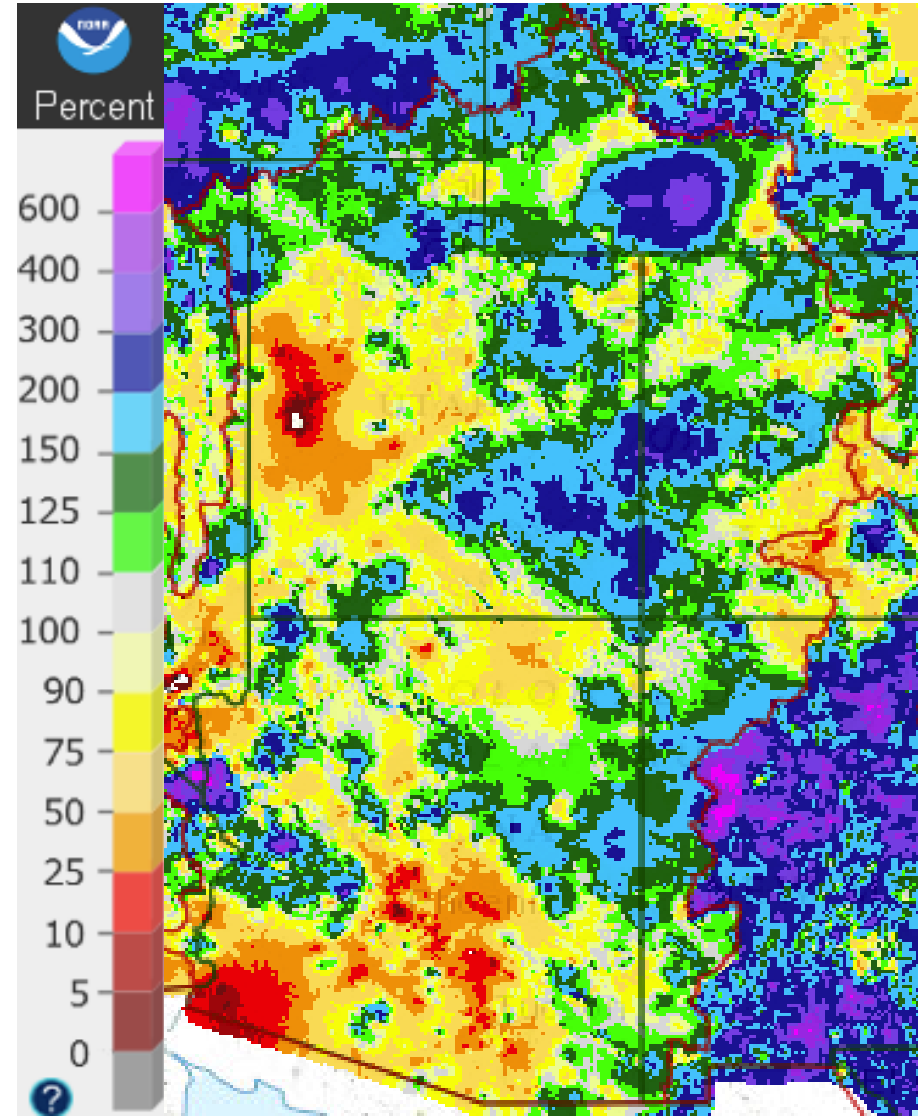
Most sites in top 5 of historical record

Monthly precip distribution

June/July Precipitation



June:
Flaming Gorge: 80 % of average
Yampa: 70 % of average



July:
Flaming Gorge: 185 % of average
Yampa: 103 % of average

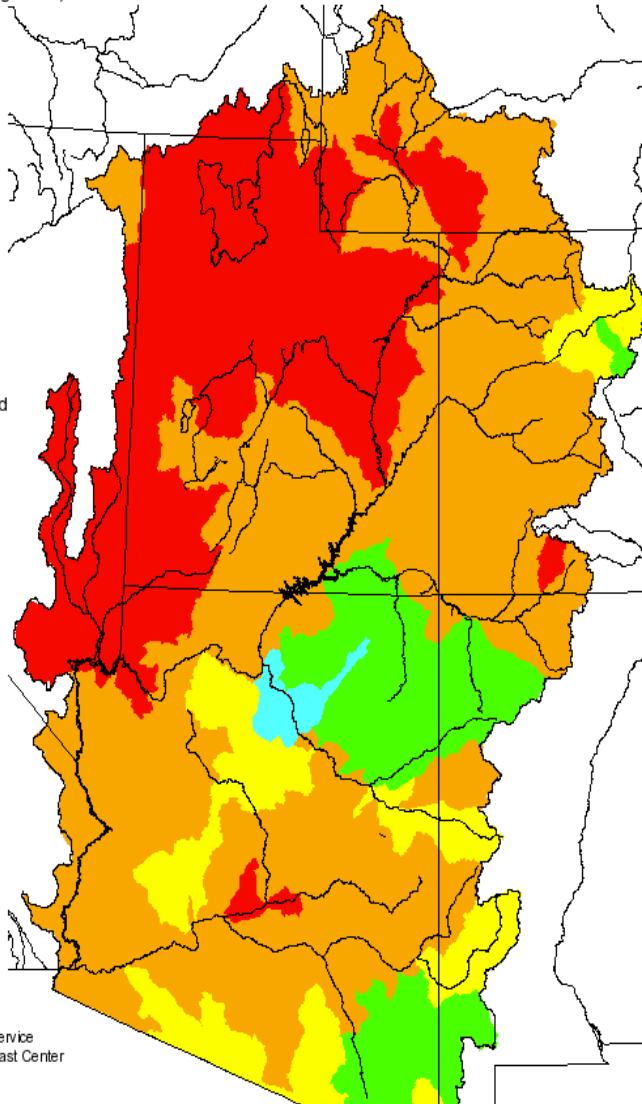
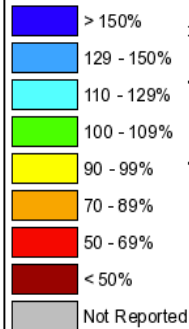
Seasonal Precipitation

May 1st

Seasonal Precipitation, October 2014 - April 2015

(Averaged by Hydrologic Unit)

% Average



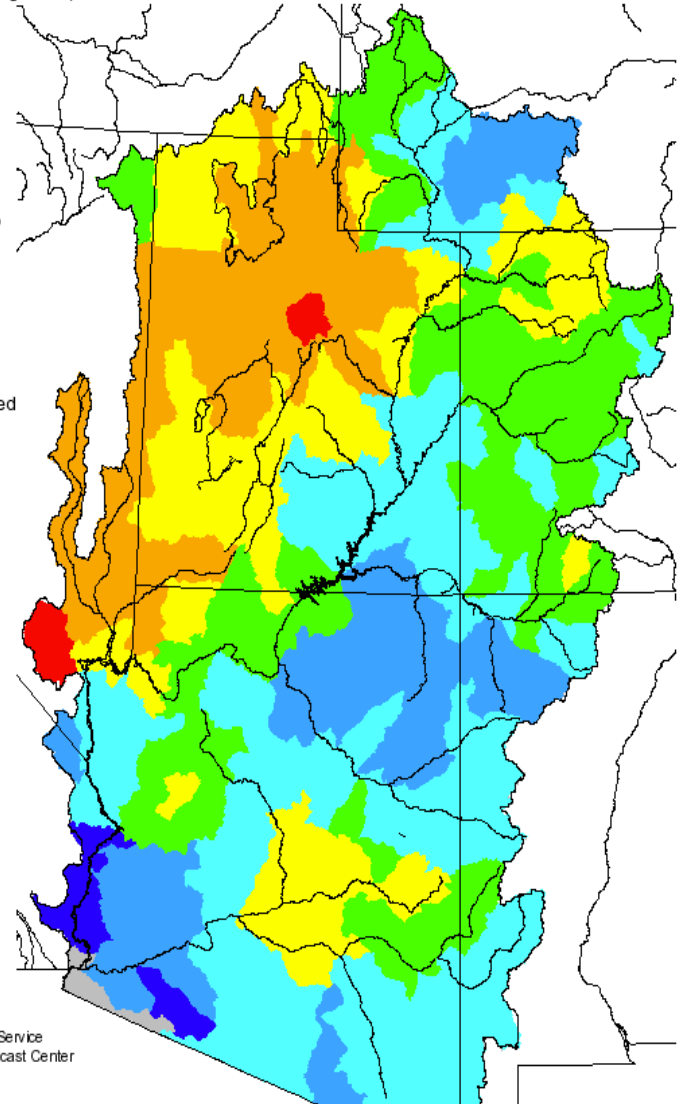
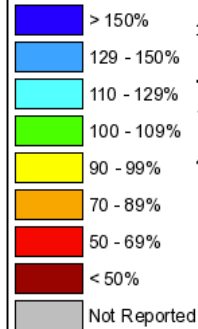
Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

August 1st

Seasonal Precipitation, October 2014 - July 2015

(Averaged by Hydrologic Unit)

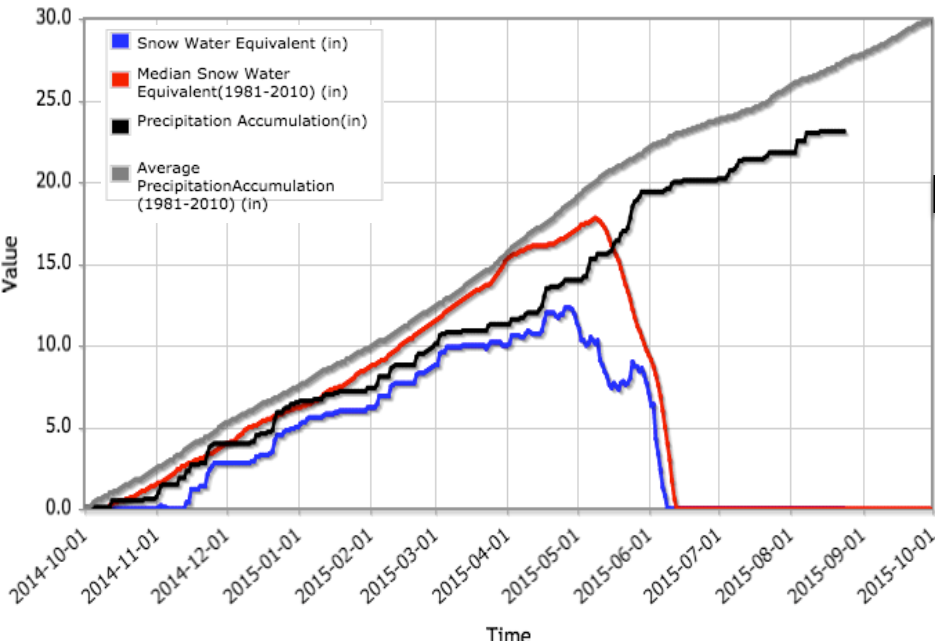
% Average



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Snow vs Rain

Steel Creek Park (790) Utah SNOTEL Site - 10200 ft



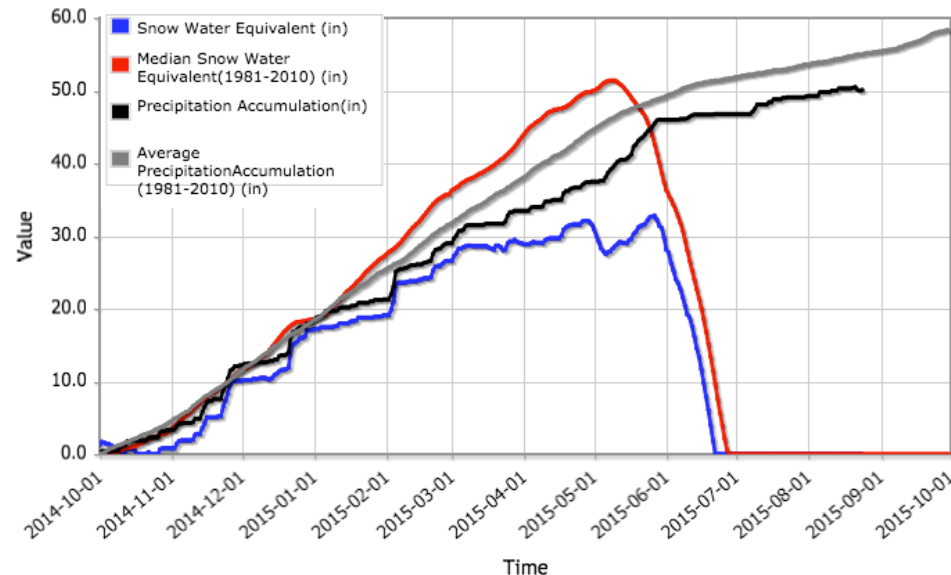
2015

Snow= 55% of Seasonal Precipitation

Normal

Snow= 70 % of Seasonal Precipitation

Tower (825) Colorado SNOTEL Site - 10500 ft



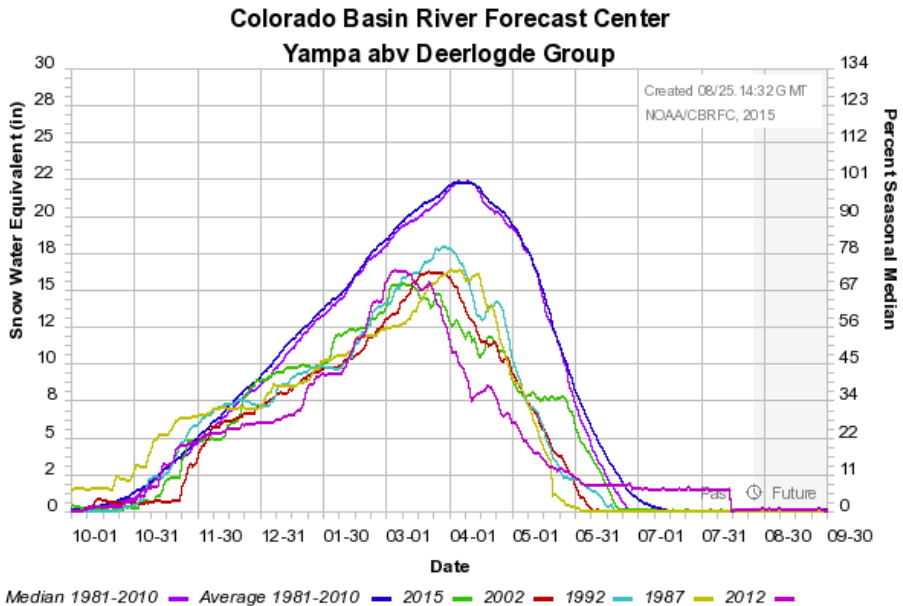
2015

Snow= 65% of Seasonal Precipitation

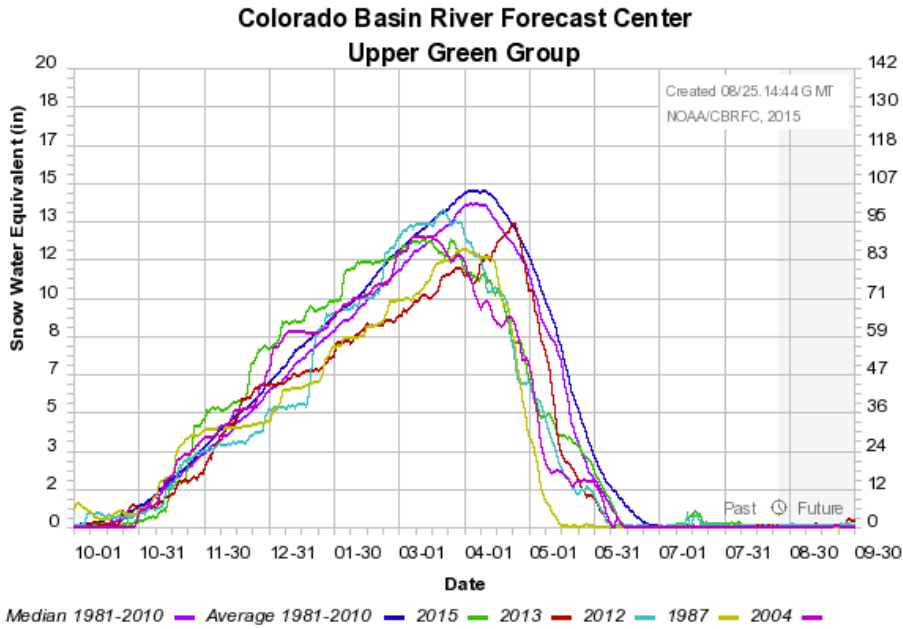
Normal

Snow= 95 % of Seasonal Precipitation

Snow vs Rain



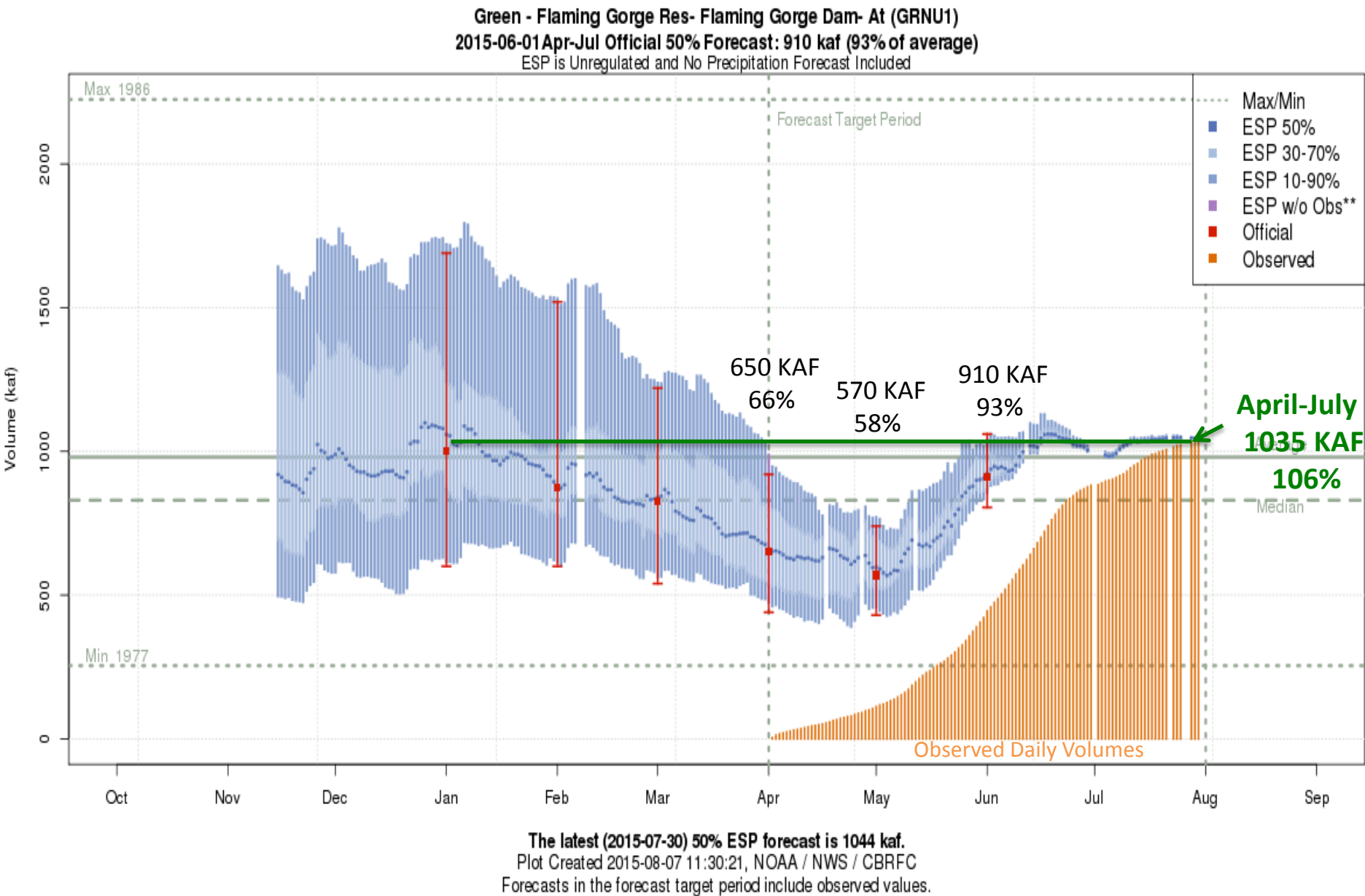
Year	April-July (KAF)
2015	1042 (84%)
2012	418 (34%)
2002	366 (30%)
1992	596 (48%)
1987	763 (62%)



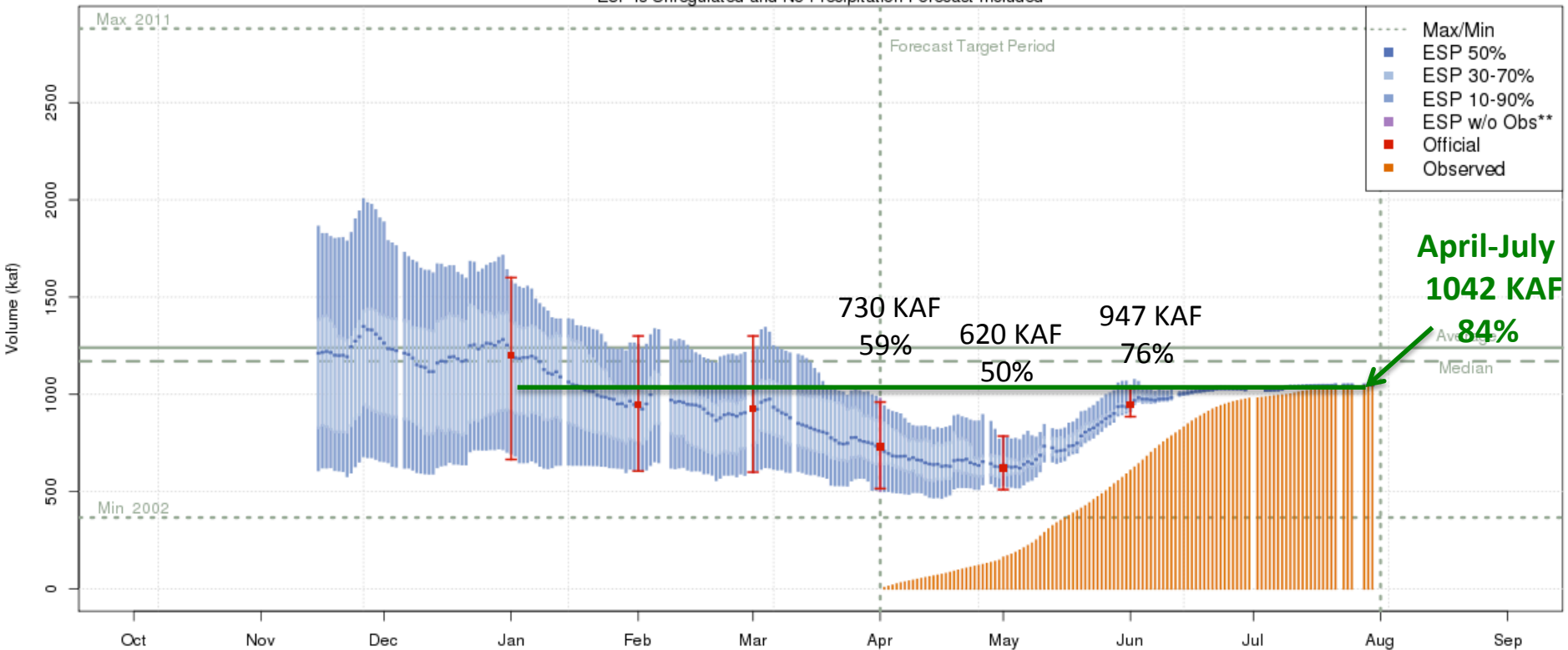
Year	April-July (KAF)
2015	1035 (106%)
2013	361 (37%)
2004	530 (54%)
1987	982 (100%)

Similar snow years that didn't have wet springs had lower April-July runoff volumes.

How the cool wet weather impacted the forecasts and observed runoff volumes:



Yampa - Deerlodge Park (YDLC2)
2015-06-01 Apr-Jul Official 50% Forecast: 945 kaf (76% of average)
 ESP is Unregulated and No Precipitation Forecast Included



The latest (2015-07-30) 50% ESP forecast is 1047 kaf.
 Plot Created 2015-08-07 11:58:12, NOAA / NWS / CBRFC
 Forecasts in the forecast target period include observed values.

Water Supply Forecasts

- Include 5 days of forecast precipitation then uses climatology (historical average)
- Observed May-July precipitation was above average so forecasts were low

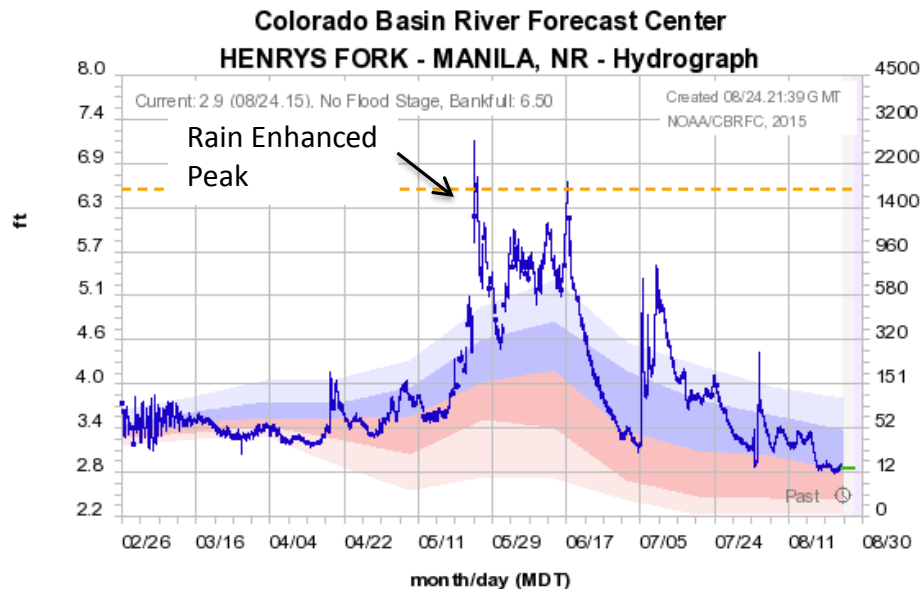
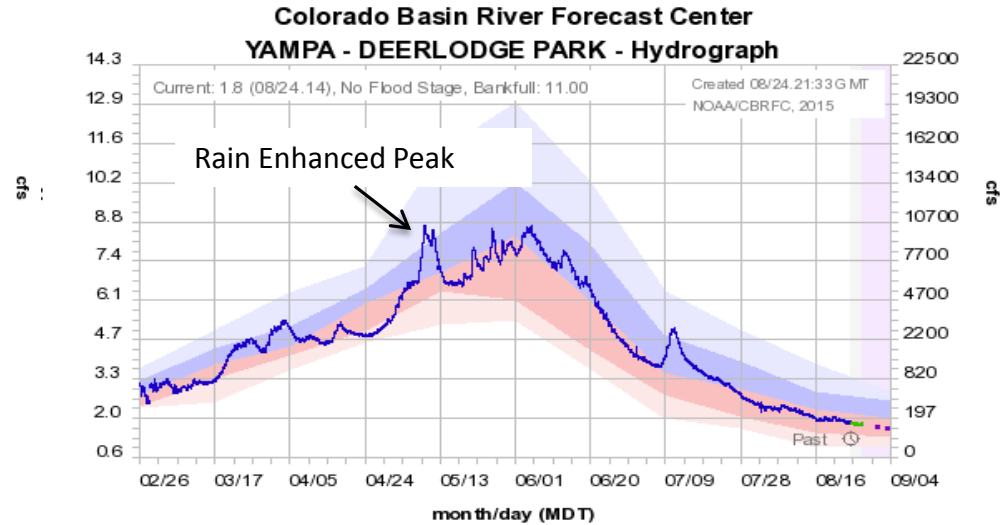
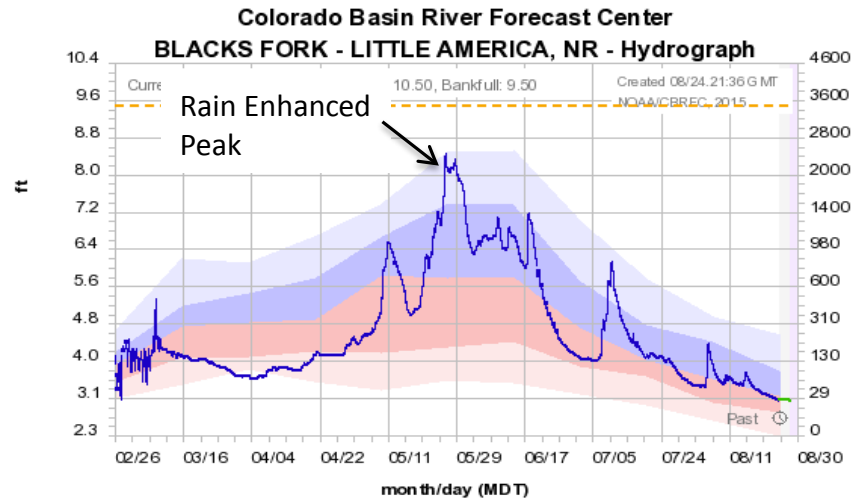
Snow

- High elevation snow held (increased) into early June-impacted runoff timing & volumes

Demand

- Reduced demand (irrigation/diversions)
- Not all are known but “typical” behavior is built into model & forecasts
- Much less depletions to the river system also impact final runoff volumes

Streamflow

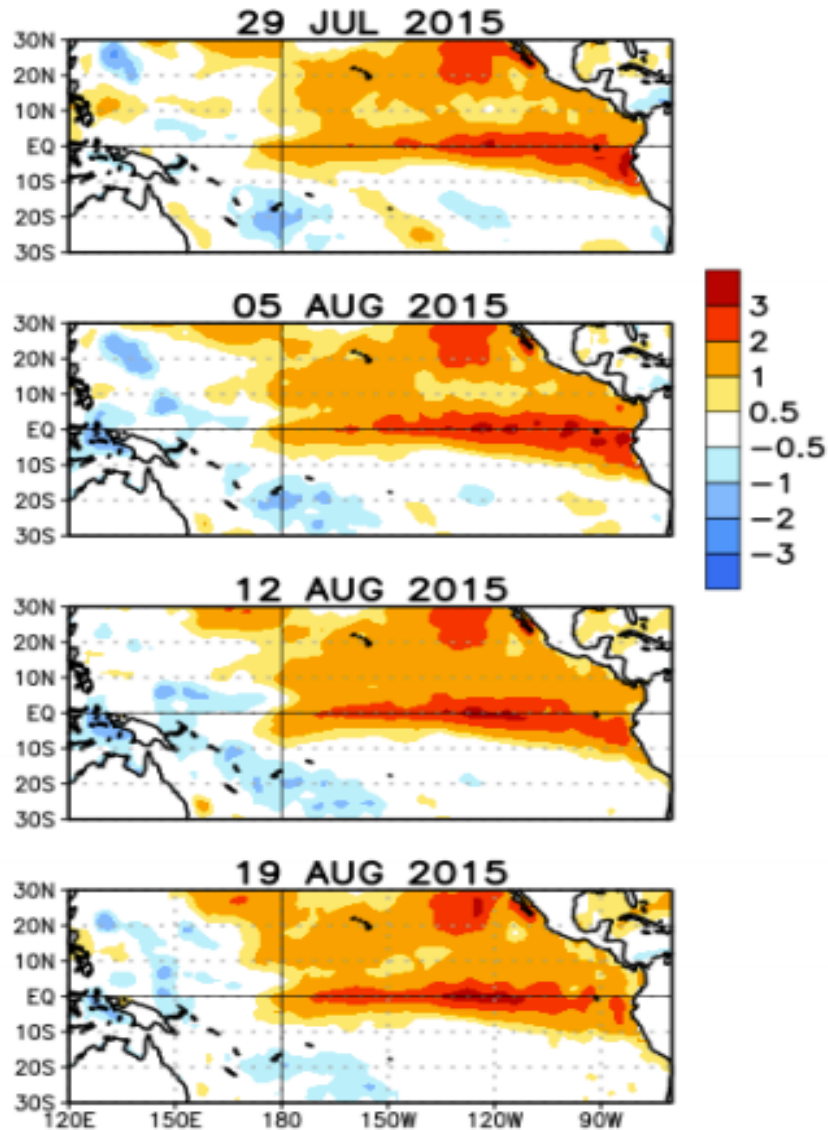


April early season peak flow forecasts ended up being too low. They were based on snow conditions not future rainfall.

Rain continued to influence peaks into June as it combined with late season snowpack.

Strengthening El Nino

Weekly SST Anomalies (DEG C)



Observed Sea Surface Temperatures

Mid-Aug 2015 Plume of Model ENSO Predictions

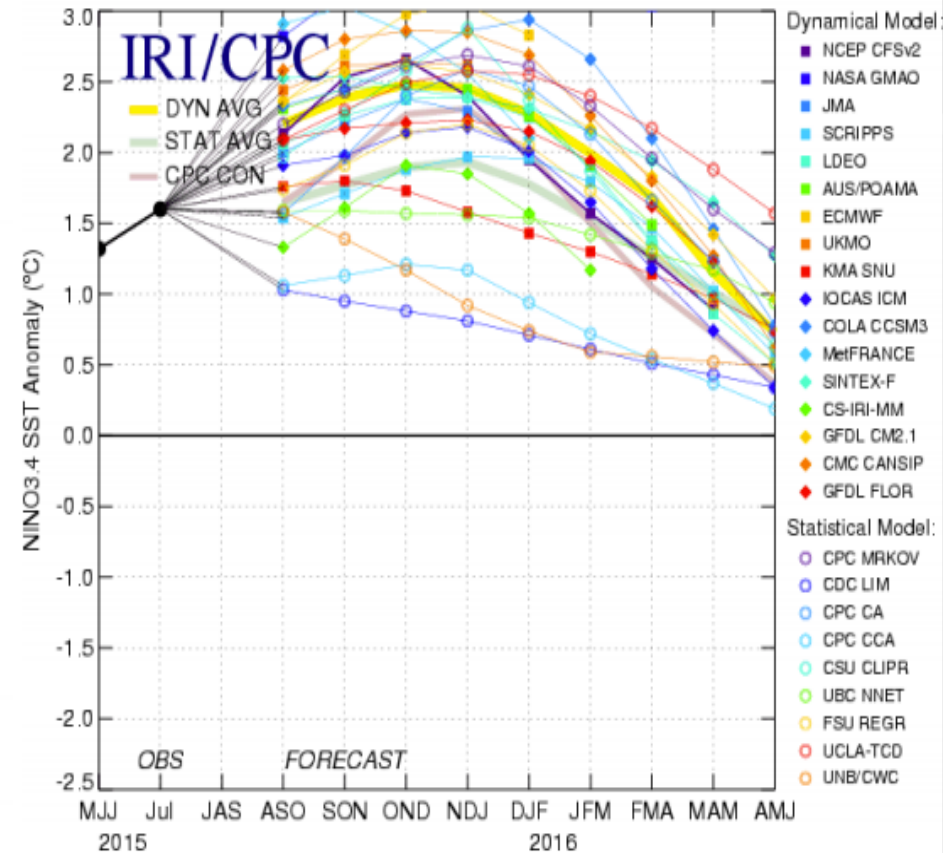
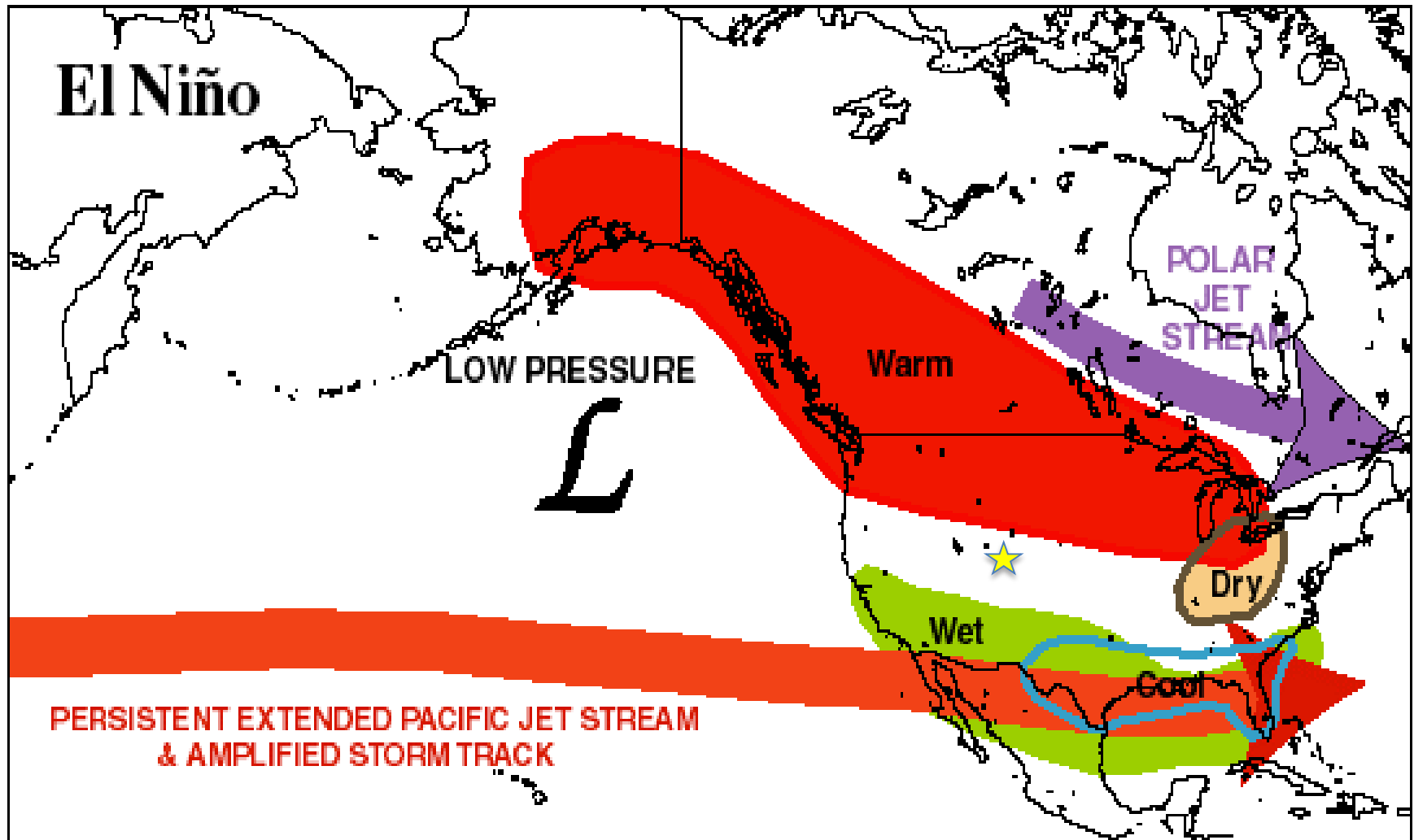


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 18 August 2015).

Sea Surface Temperature Forecasts

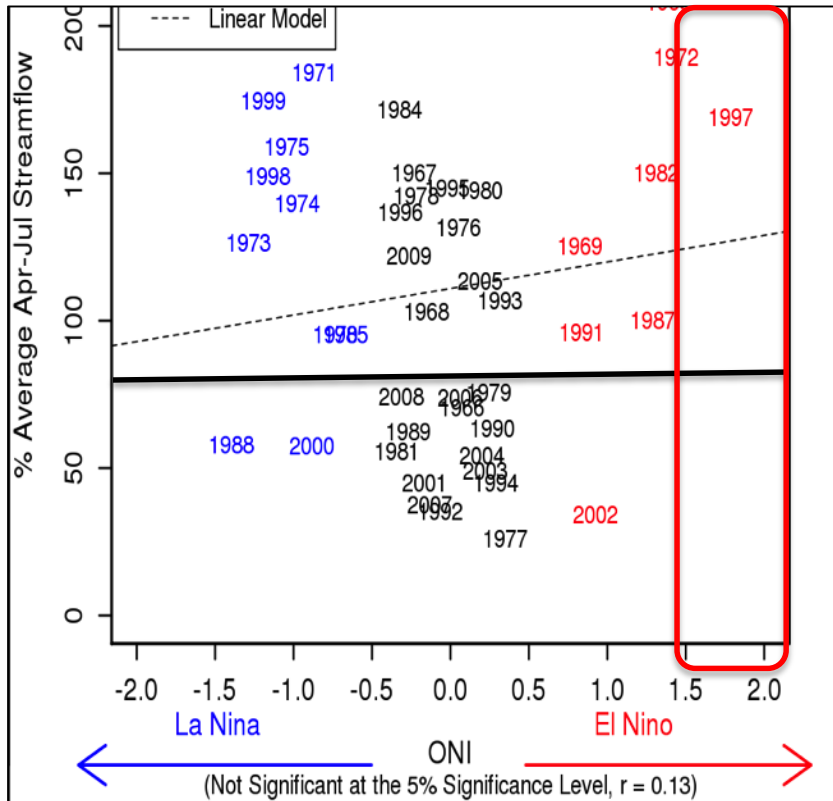
What does that mean for Upper Green/Yampa?



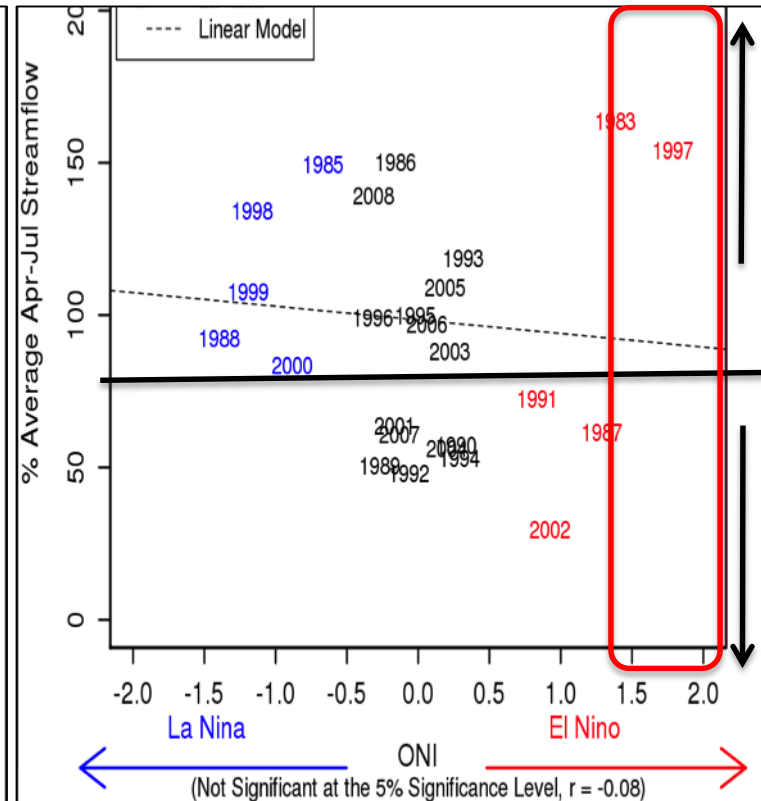
Typical Winter El Nino Weather Pattern

What does that mean for Upper Green/Yampa?

Flaming Gorge ONI



Yampa ONI

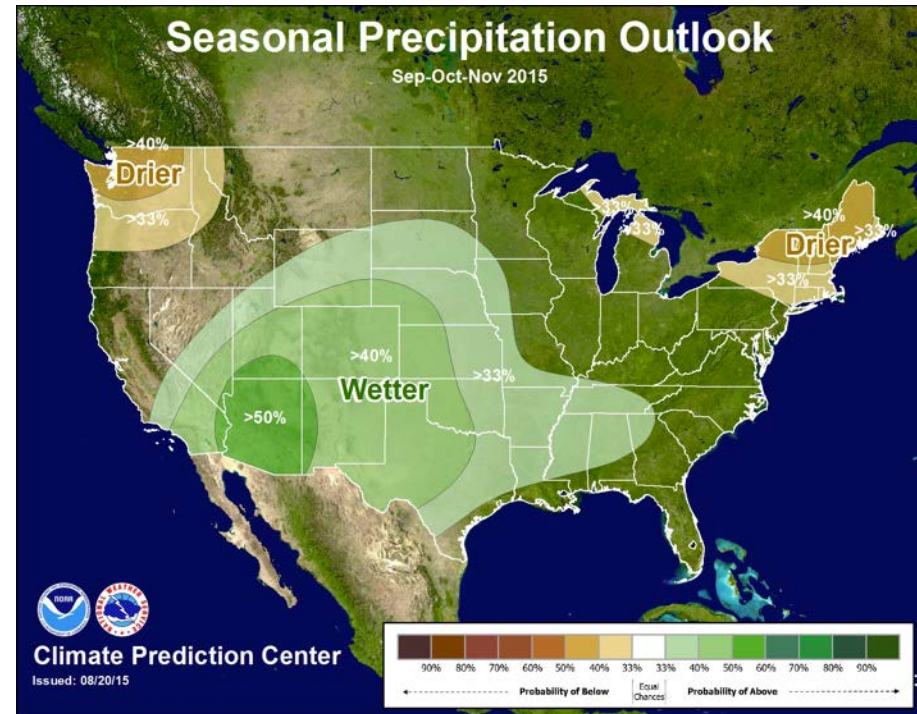
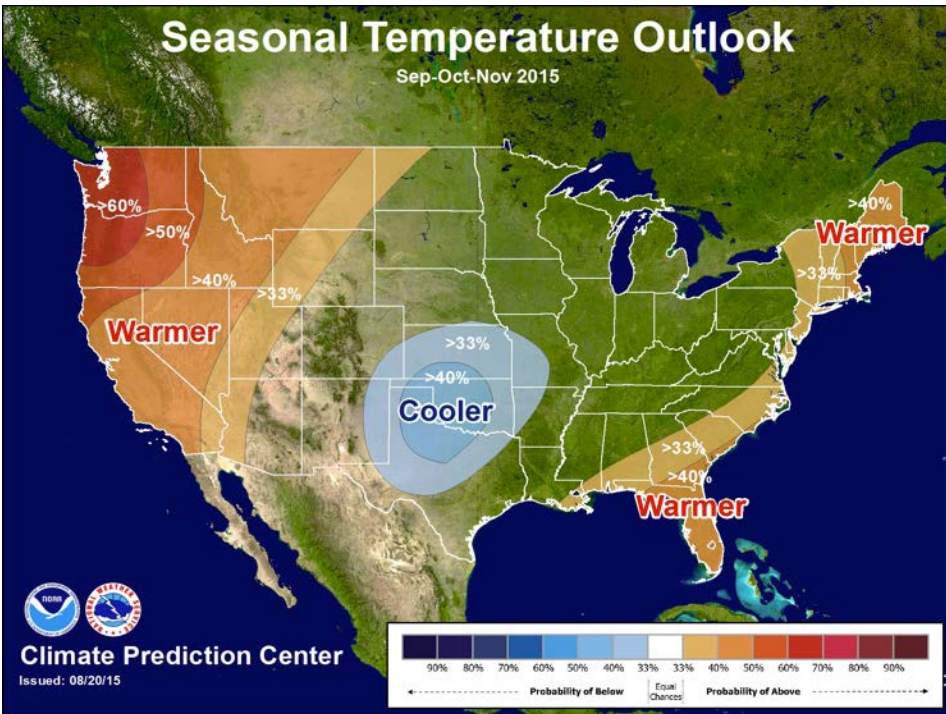


Above average streamflow

Below average streamflow

No strong correlation and small sample size for similar strength El Niño events

3-Month Climate Outlooks



2015 Take-Away:

- Below normal snow conditions and warm winter
- Wet cold spring, especially May
- Much above average precipitation in May and July
- Volume and peak flow forecasts were too low
- Early season forecasts (50% exceedance) are expected to miss the mark if future conditions end up extremely wet or dry
- Important to look at the forecast range as well as the 50% forecasts
- Model behaved as expected (some years should not be in forecast range)
- Expecting El Nino conditions for fall/winter
- No strong correlation for conditions in Upper Green and El Nino

Questions/Comments/Feedback?



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