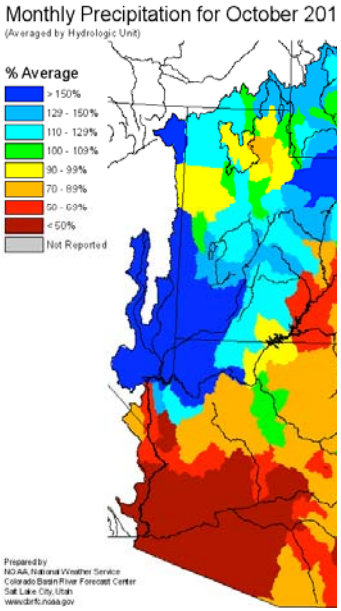
Fontenelle Working Group Meeting: CBRFC Forecast Update

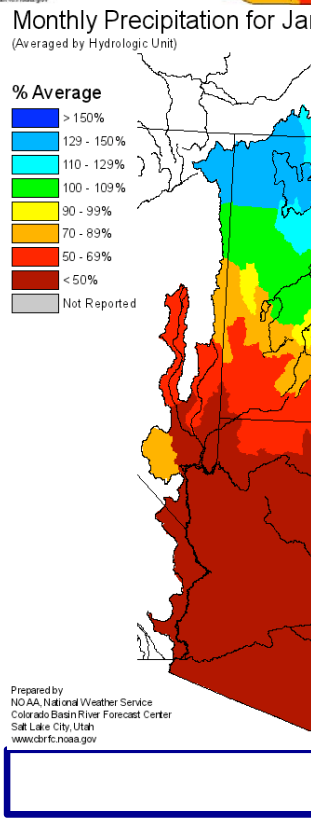
April 26, 2012

Ashley Nielson
NWS Colorado River Basin Forecast Center

Outline

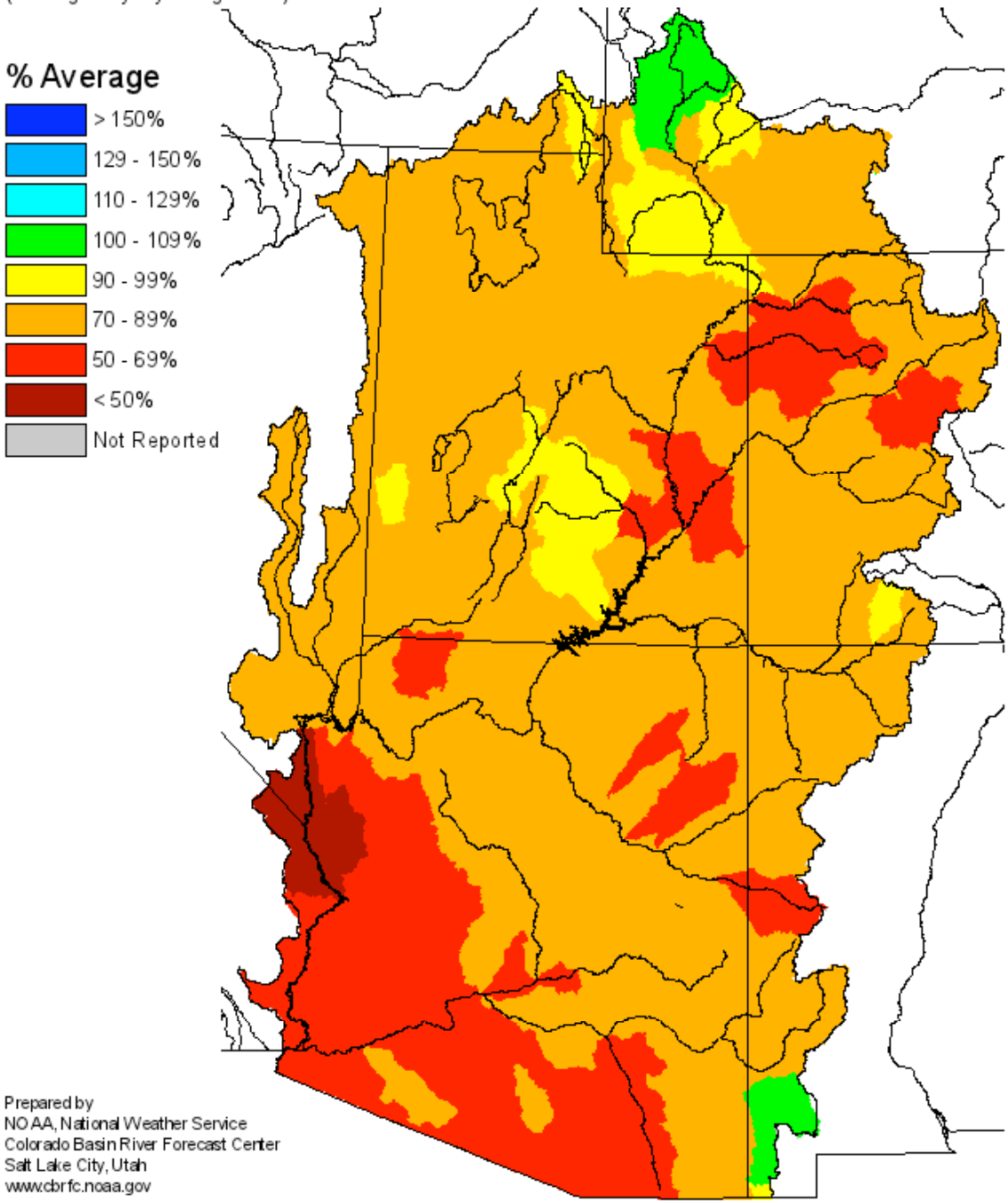
1. Current Conditions
   - Precipitation/Temperature
   - Snow
   - Short term weather forecast
2. New 30 year averages
3. Water Supply Forecast

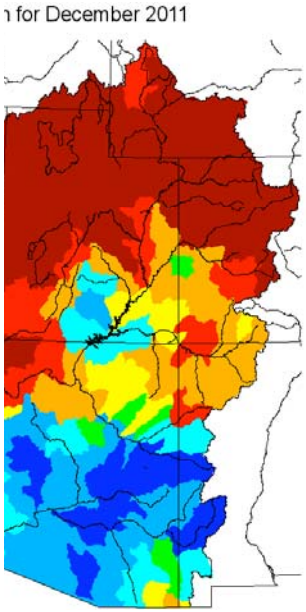


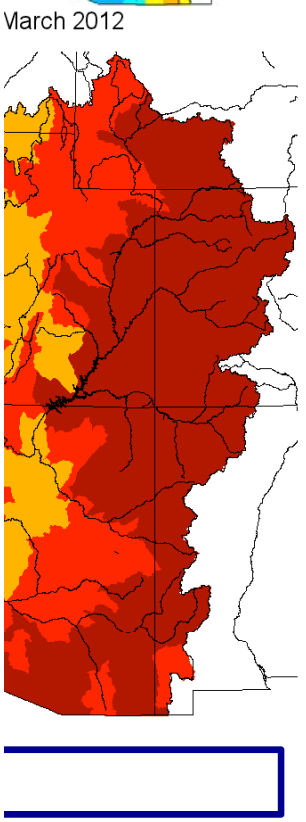


Seasonal Precipitation, October 2011 - March 2012

(Averaged by Hydrologic Unit)

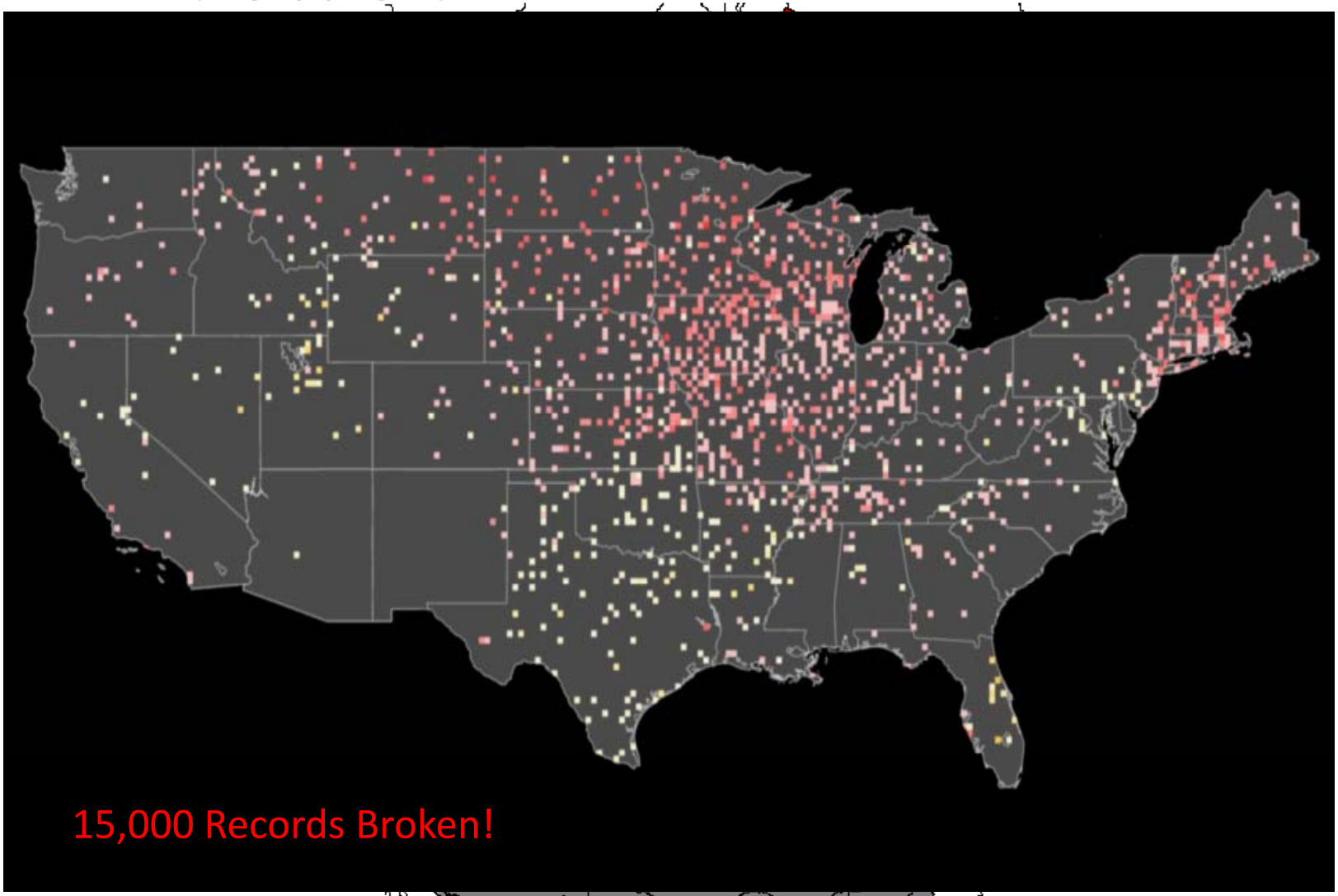






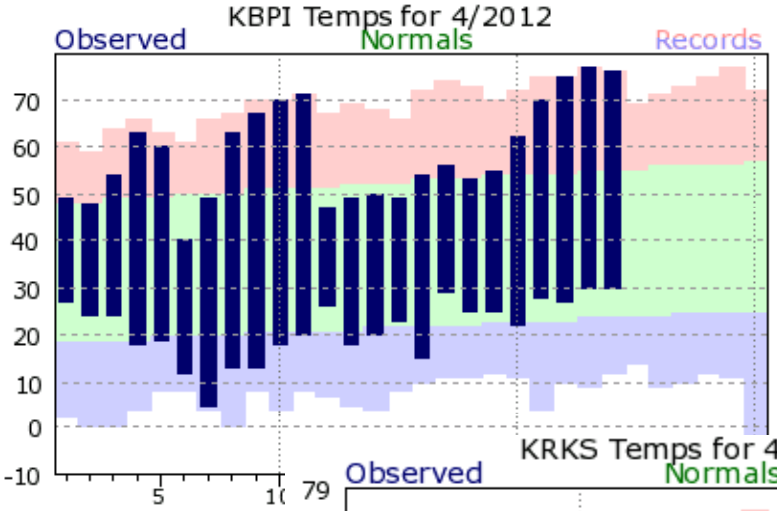
Monthly Max Temp Deviation for March 2012

(Averaged by Hydrologic Unit)

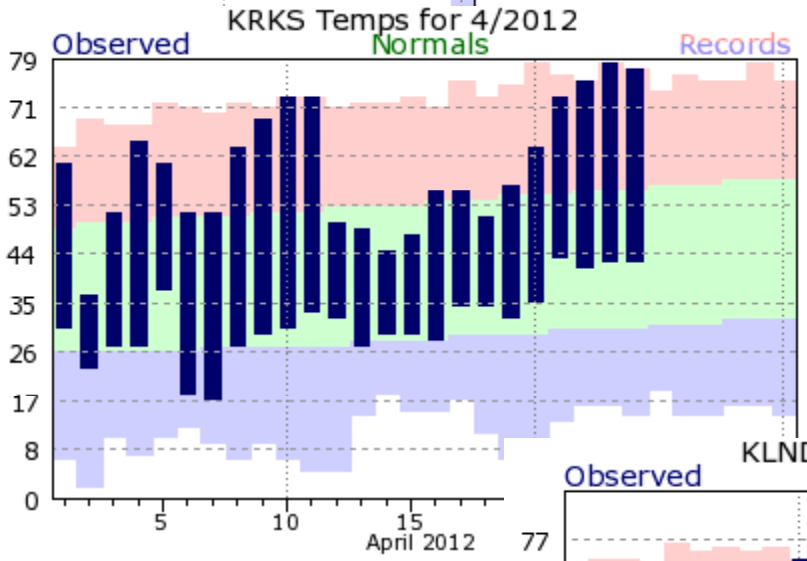


Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrfc.noaa.gov

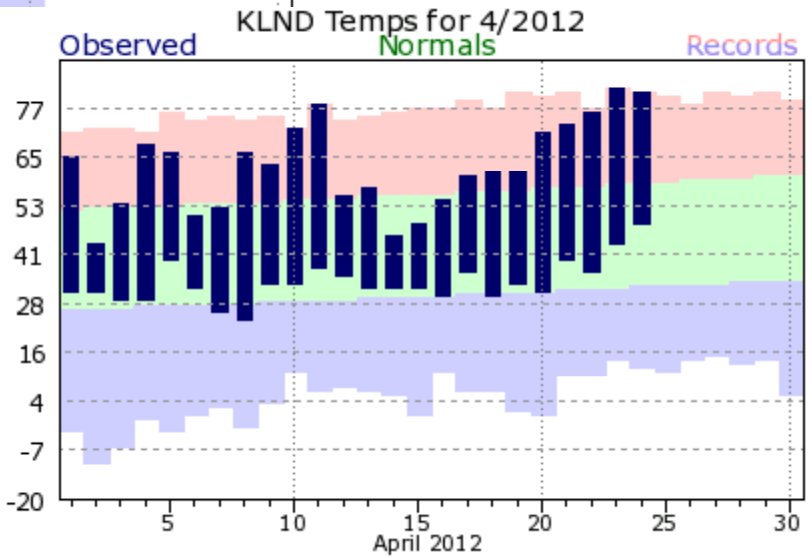
April Temperatures



Big Piney

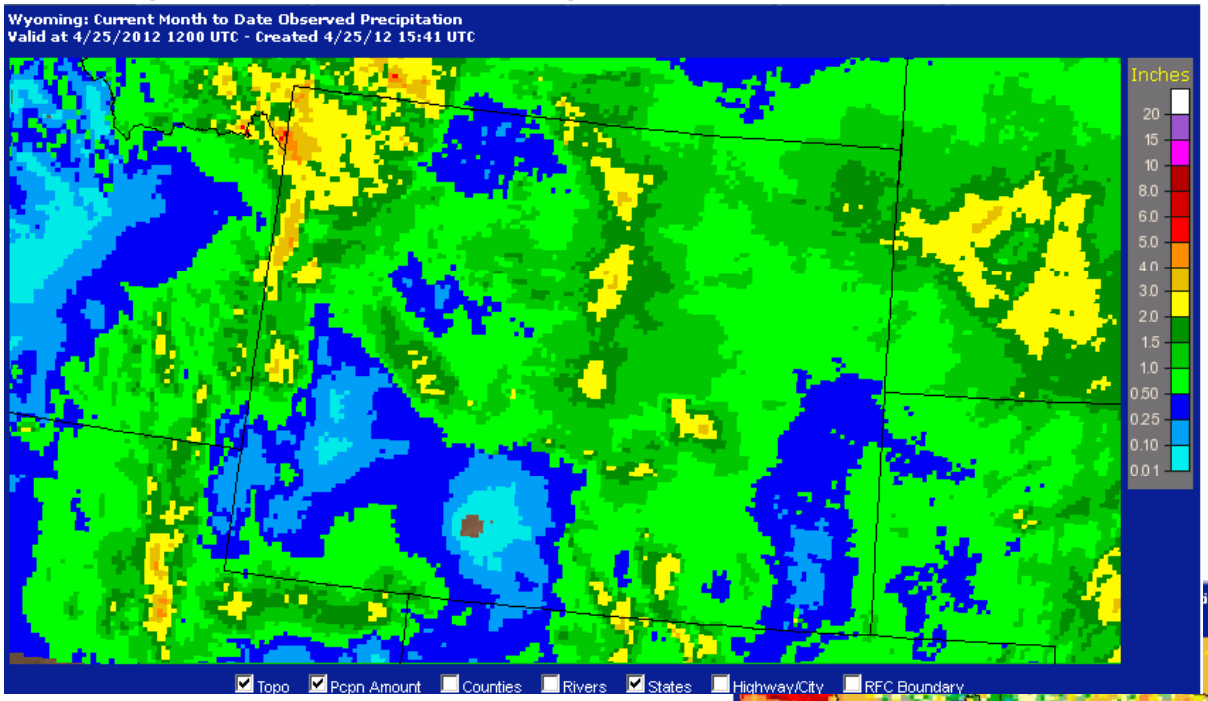


Rock Springs



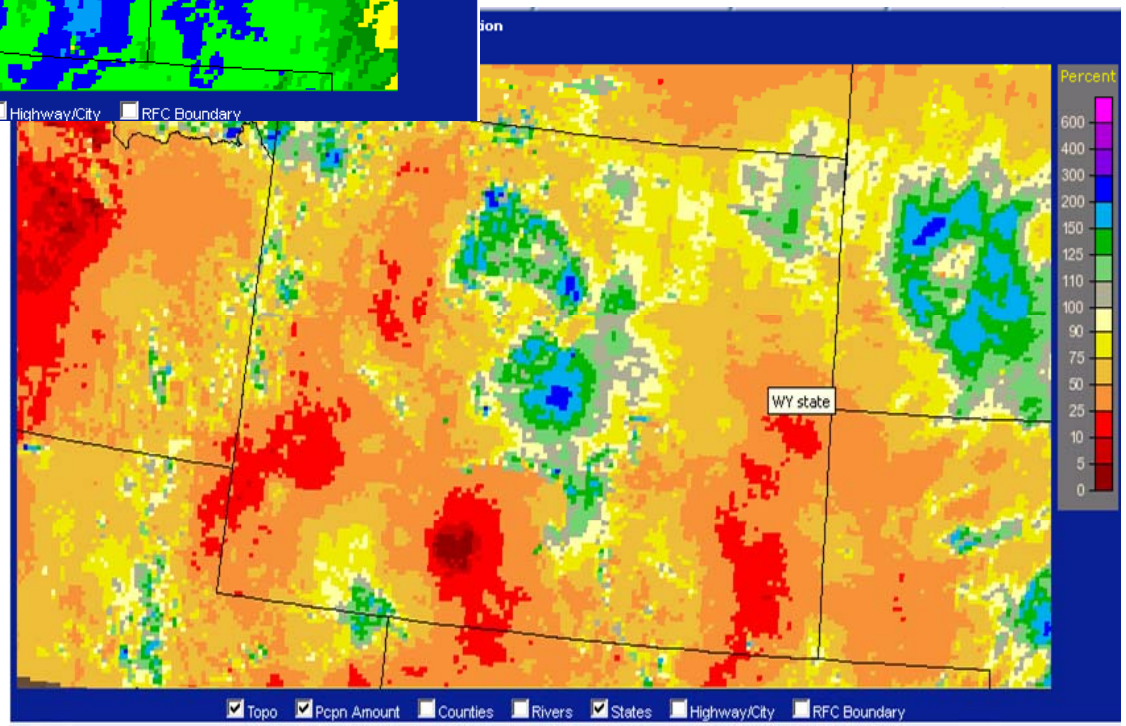
Lander

April Precipitation

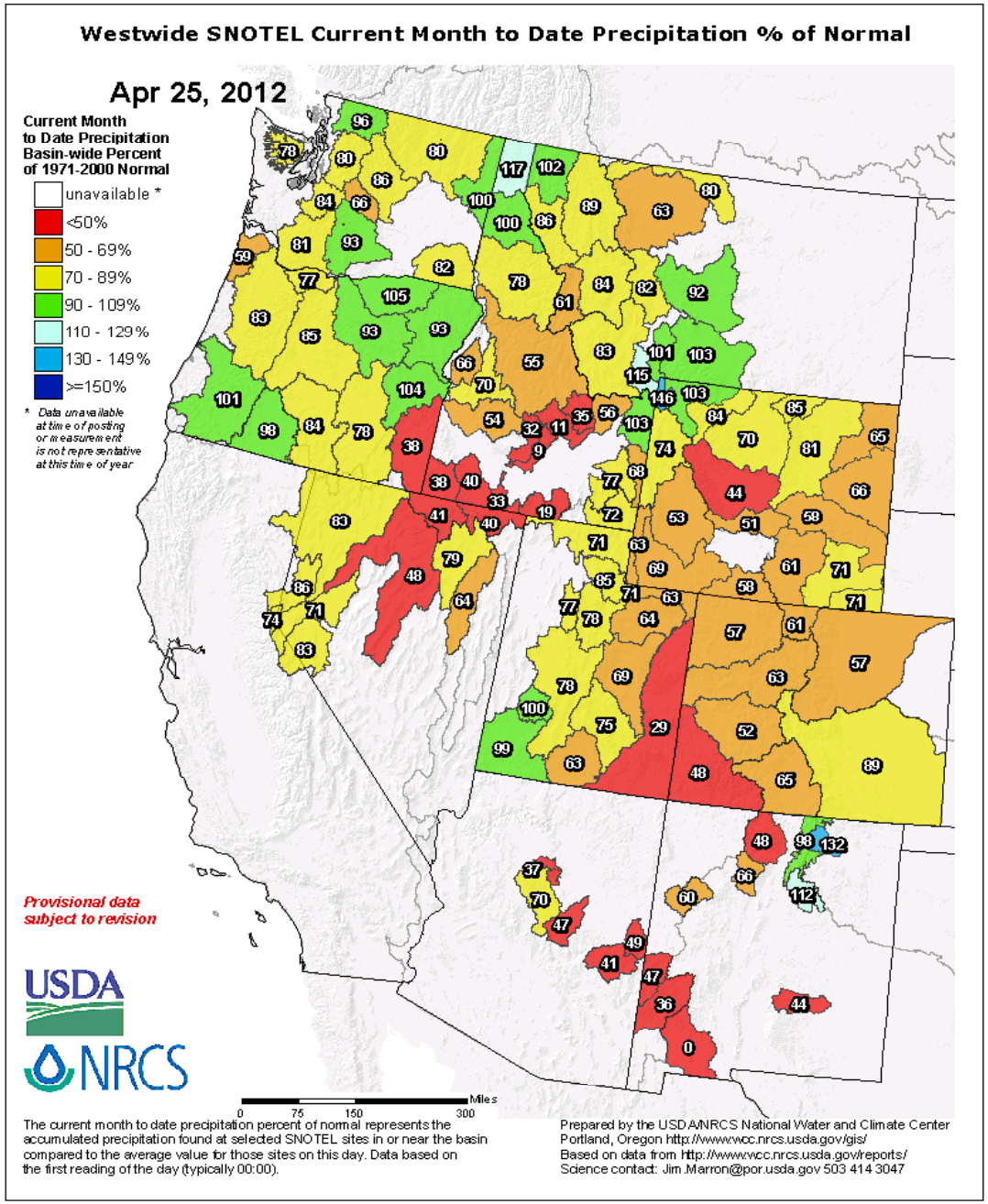


Observed

% of Normal



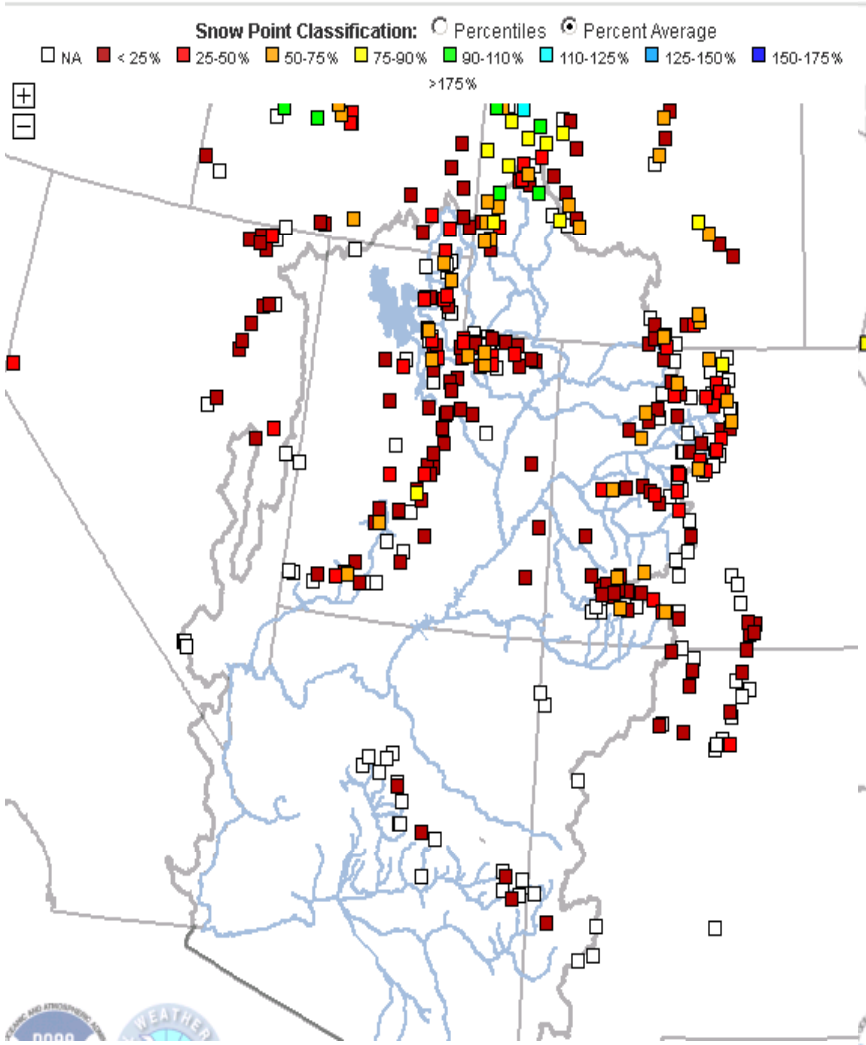
Westwide SNOTEL Current Month to Date Precipitation % of Normal



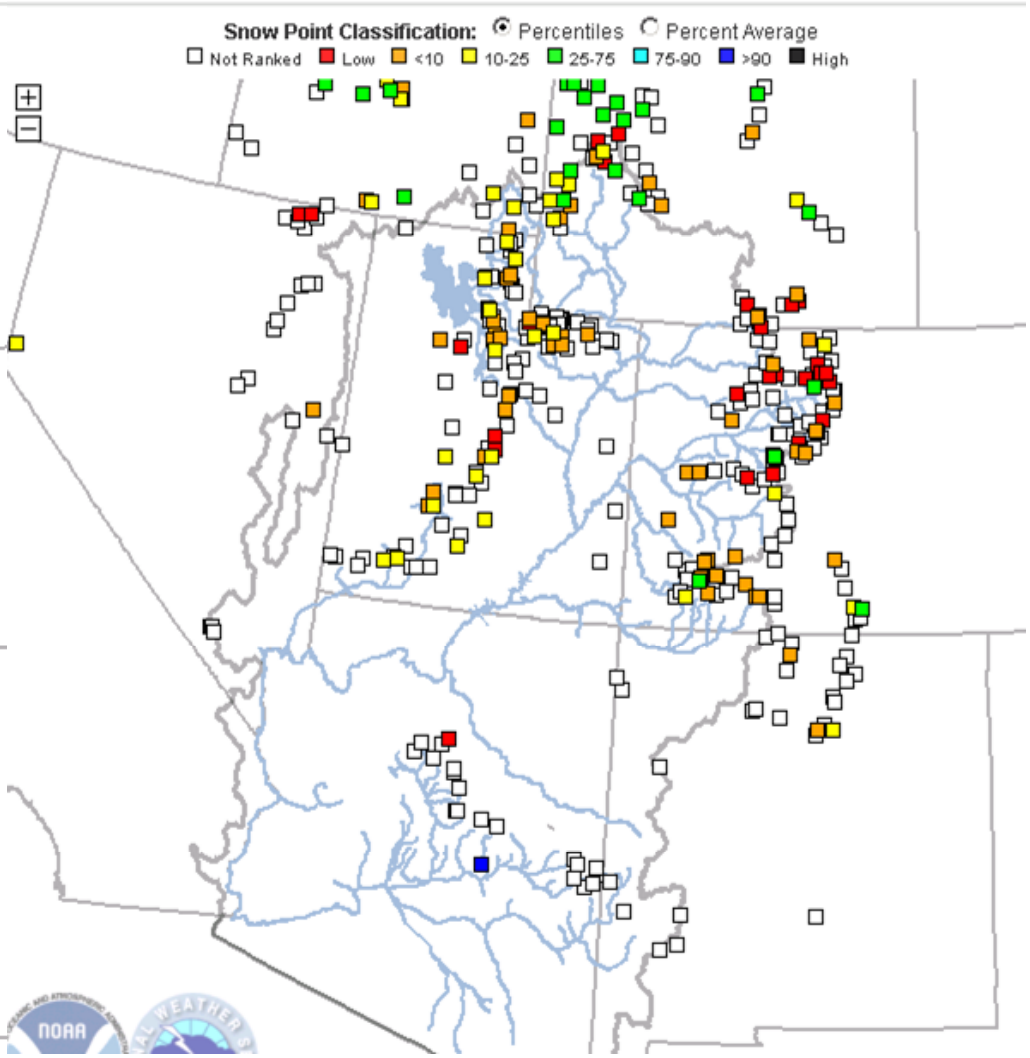
The current month to date precipitation percent of normal represents the accumulated precipitation found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by the USDA/NRCS National Water and Climate Center
Portland, Oregon http://www.wcc.nrcs.usda.gov/gis/
Based on data from http://www.wcc.nrcs.usda.gov/reports/
Science contact: Jim.Marron@por.usda.gov 503 414 3047

Snow

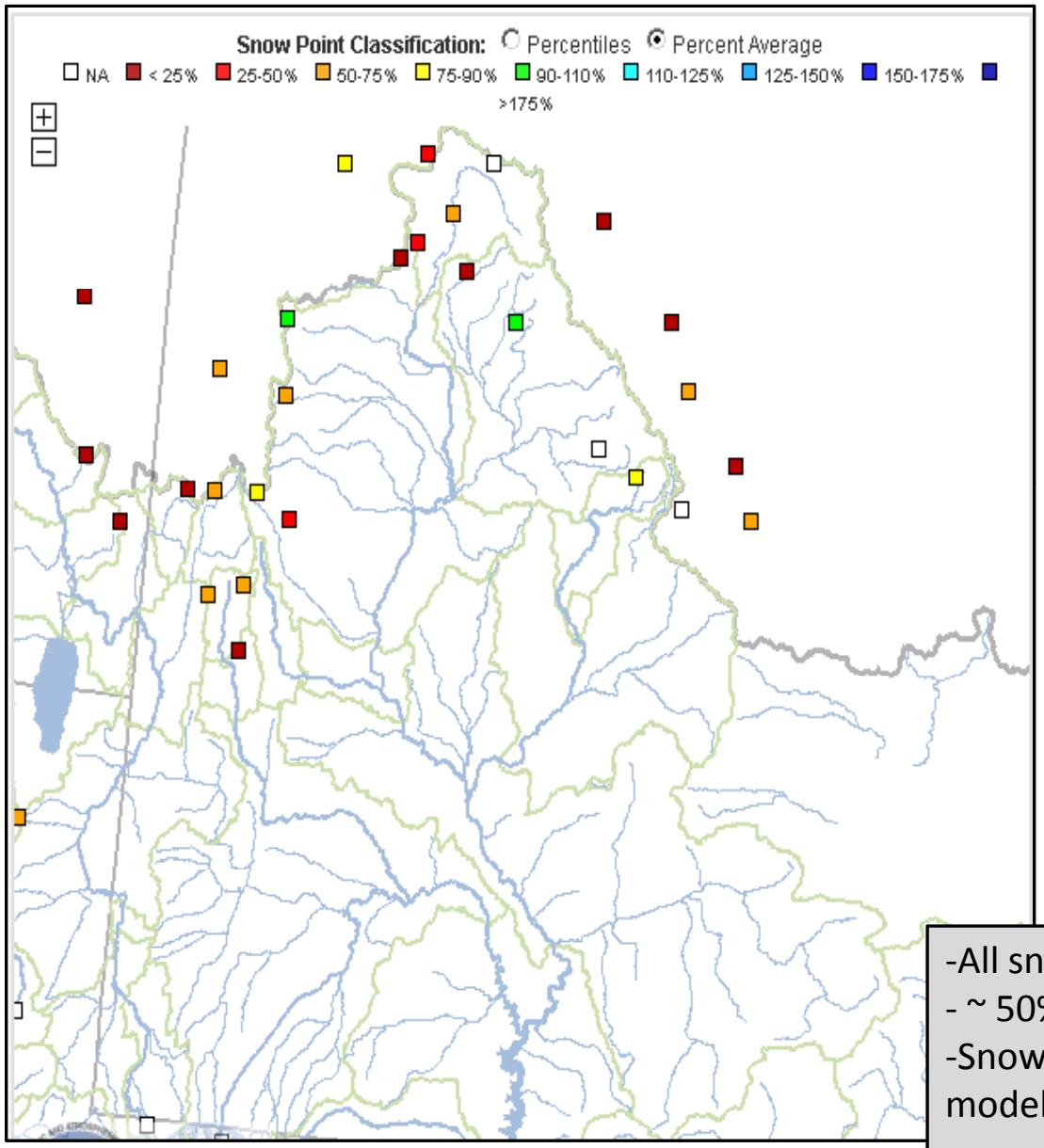


April 25 as a percent of average (above)



April 25 as a percentile (right)

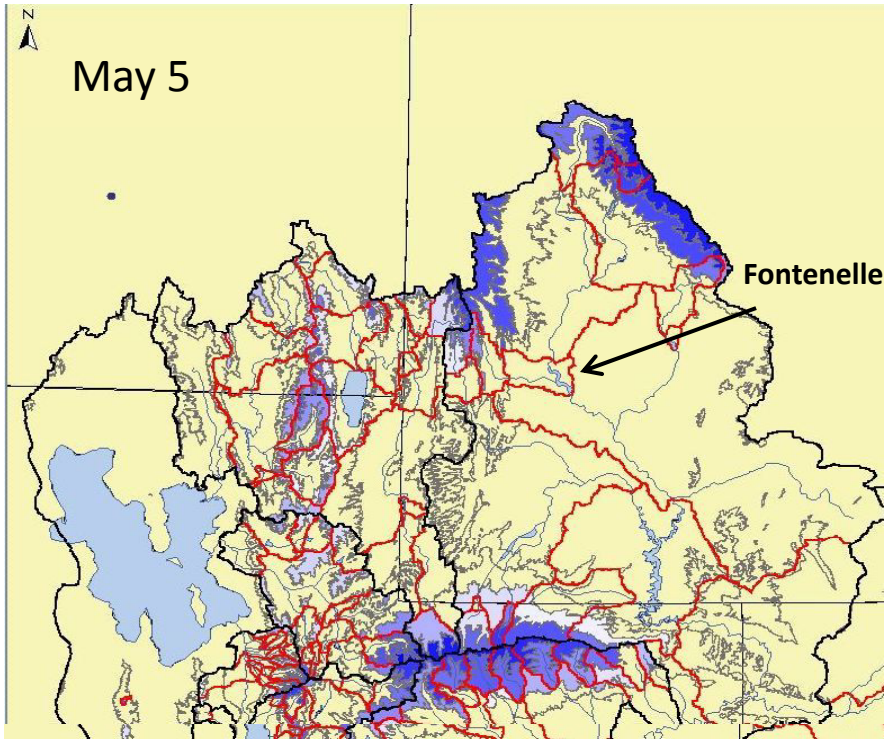
Web Reference: http://www.cbrfc.noaa.gov/gmap/cmap2.php?con=snow

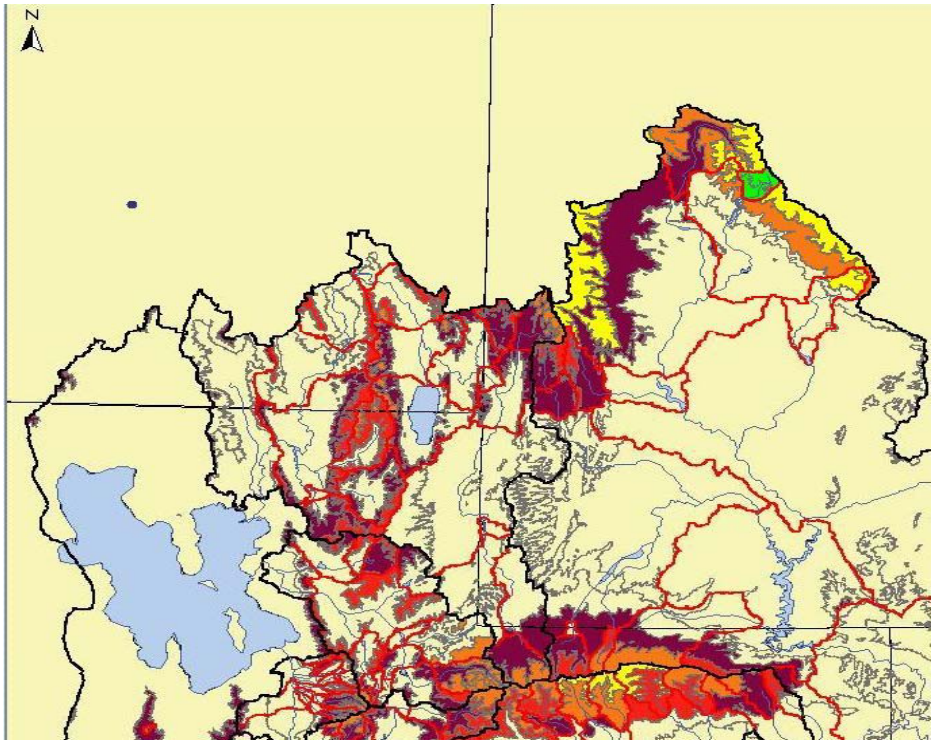


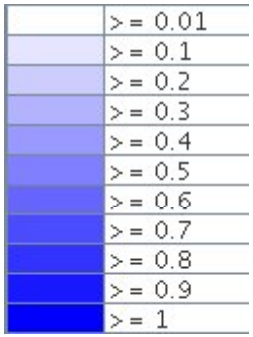
-All snotels below 10,000 ft
- ~ 50% of volume comes from above 10,000 ft
-Snowpack above 10,000 ft must be simulated by models using lower elevation sites

SNOW: Upper Green Basin (above Flaming Gorge)

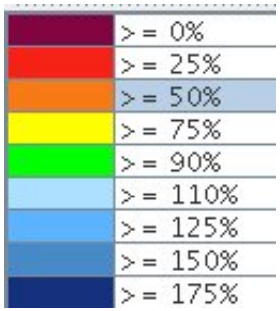
Community Hydrologic Prediction System ("CHiPS")
Snow-17 – Modeled Snow States





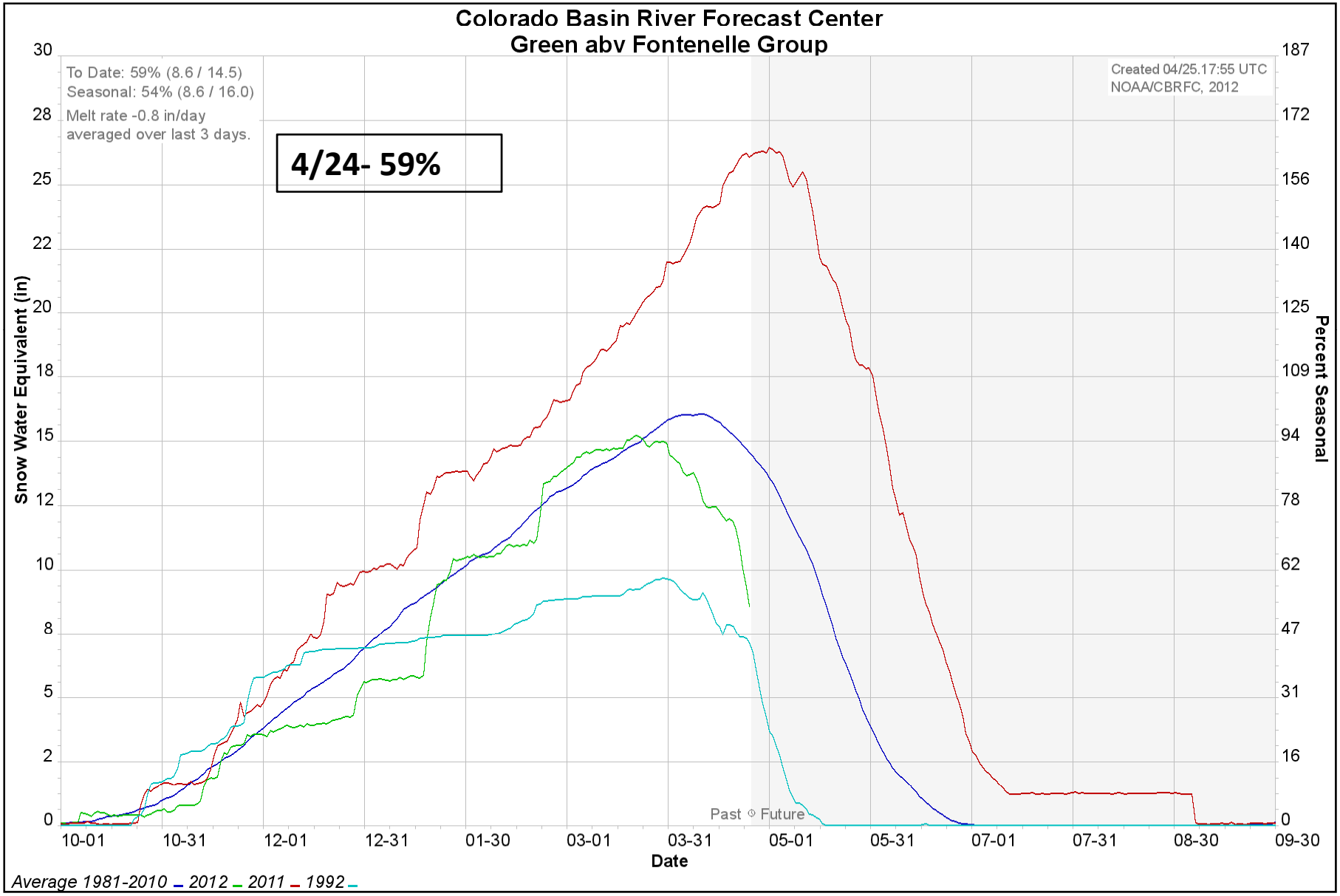


Area Extent of Snow Cover
(percent coverage)

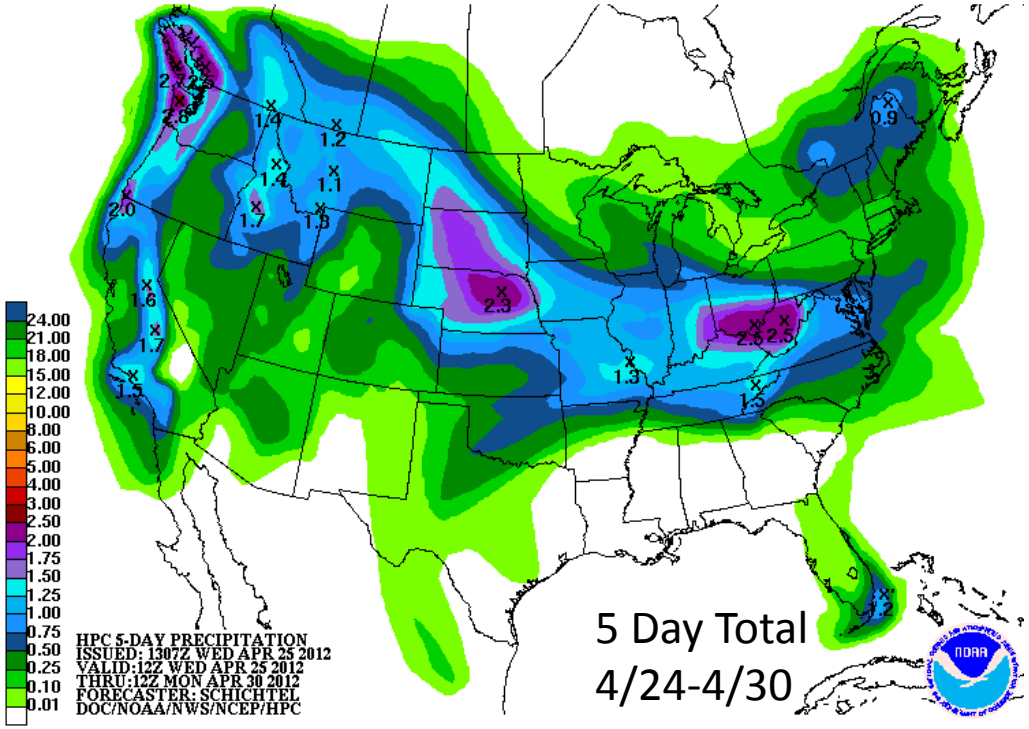


Percent of Average Model Snow Water Equivalent
(clipped at 2 inches)

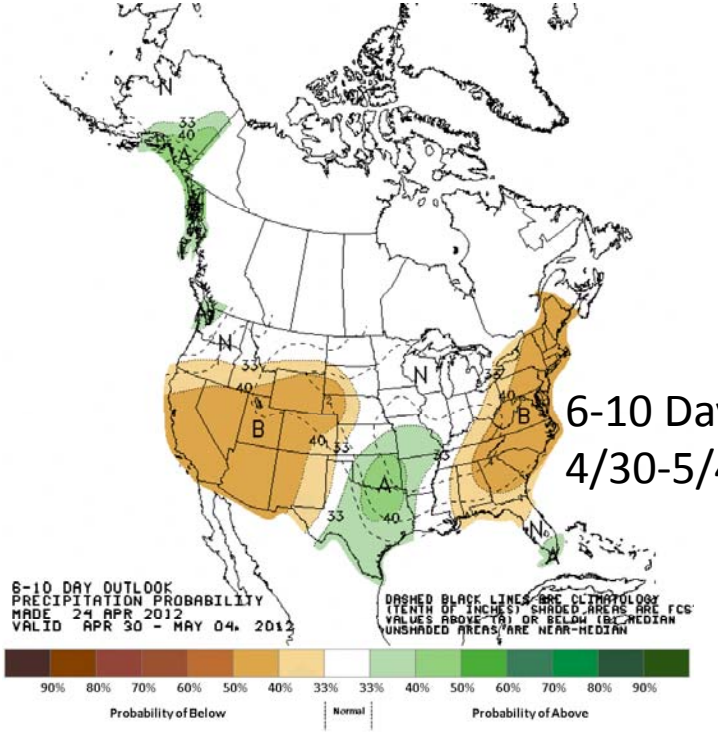
SNOW


Colorado Basin River Forecast Center
Green abv Fontenelle Group
To Date: 59% (8.6 / 14.5)
Seasonal: 54% (8.6 / 16.0)
Melt rate -0.8 in/day
averaged over last 3 days.
Created 04/25.17:55 UTC
NOAA/CBRFC, 2012
4/24- 59%
Snow Water Equivalent (in)
Percent Seasonal
Past
Future
Date
10-01
10-31
12-01
12-31
01-30
03-01
03-31
05-01
05-31
07-01
07-31
08-30
09-30
Average 1981-2010
2012
2011
1992

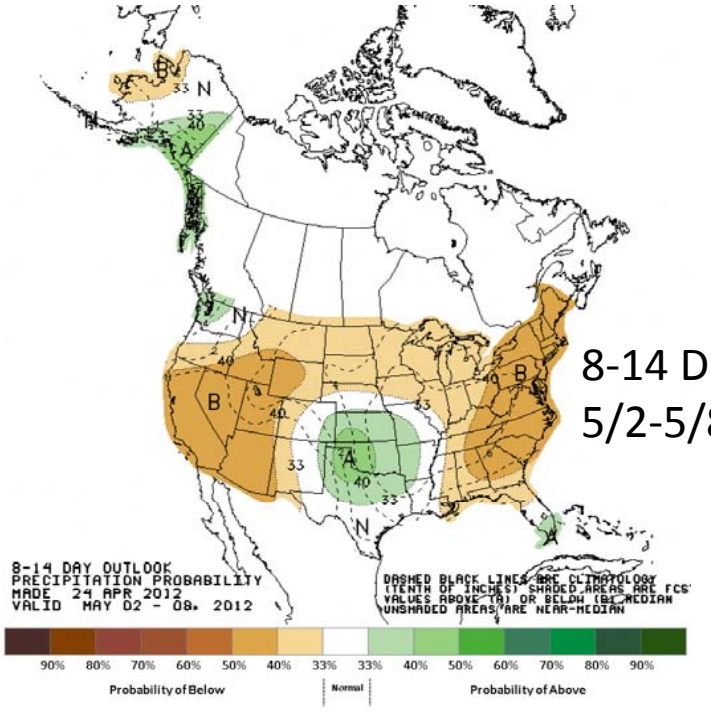
Forecast Precipitation



5 Day Total
4/24-4/30



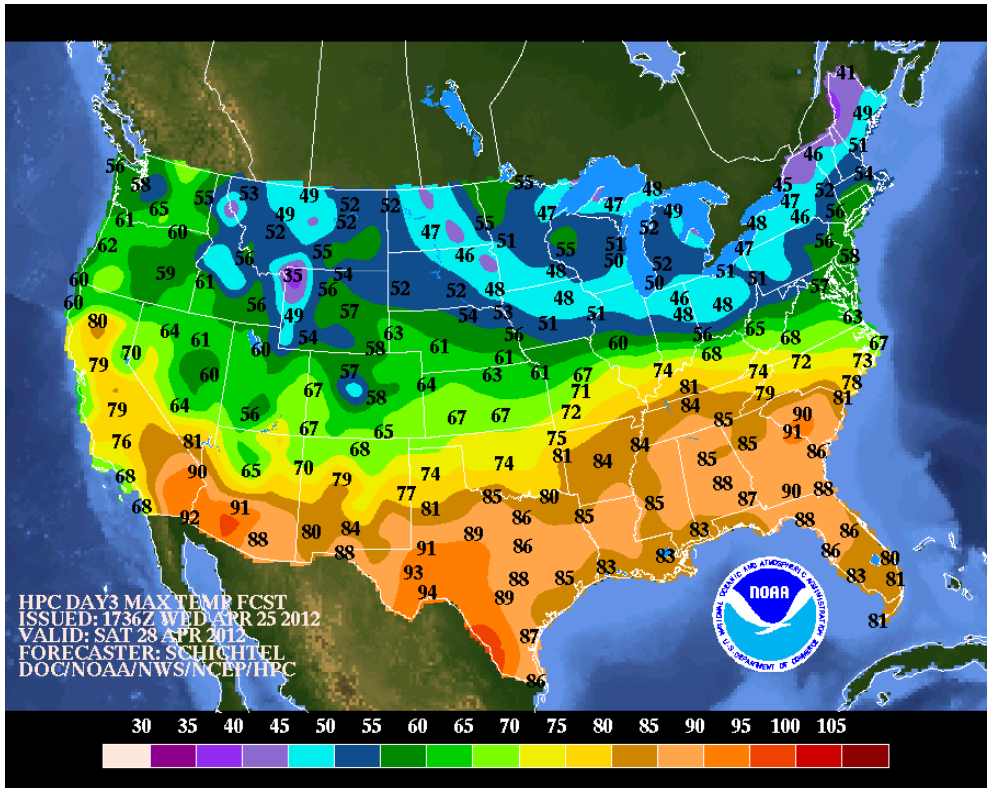
6-10 Day
4/30-5/4



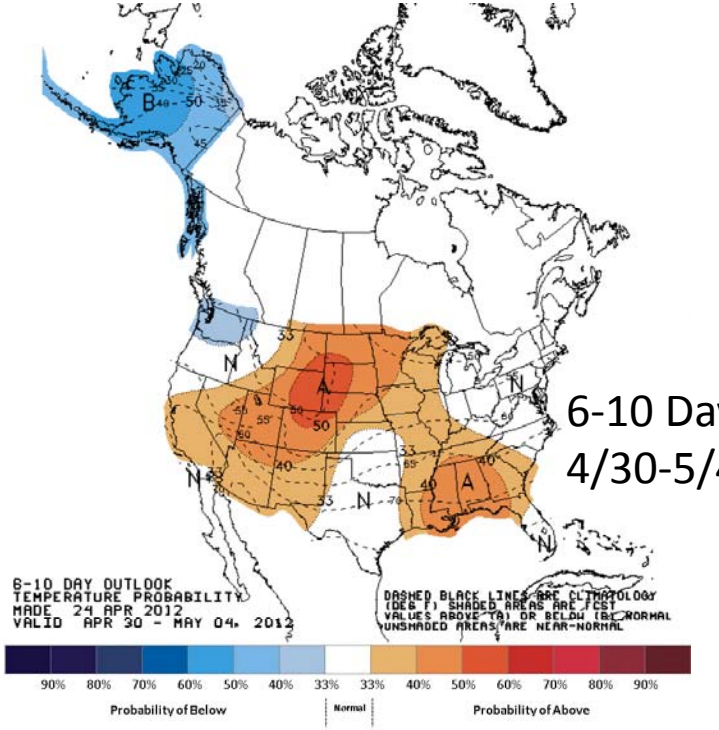
8-14 Day
5/2-5/8

- Ridge of high pressure past few days
- Cool wet trough of low pressure arriving Thursday
- Expect cooler temperatures and rain/snow at high elevations through Monday

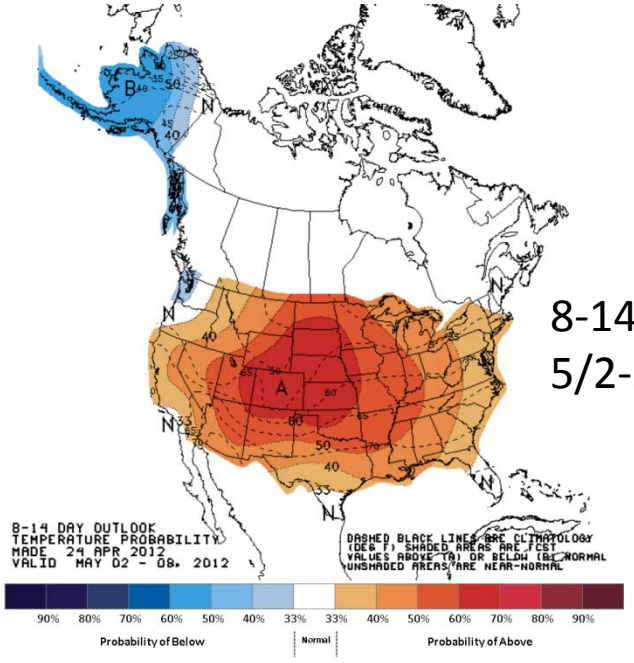
Forecast Temperature



April 28-Saturday



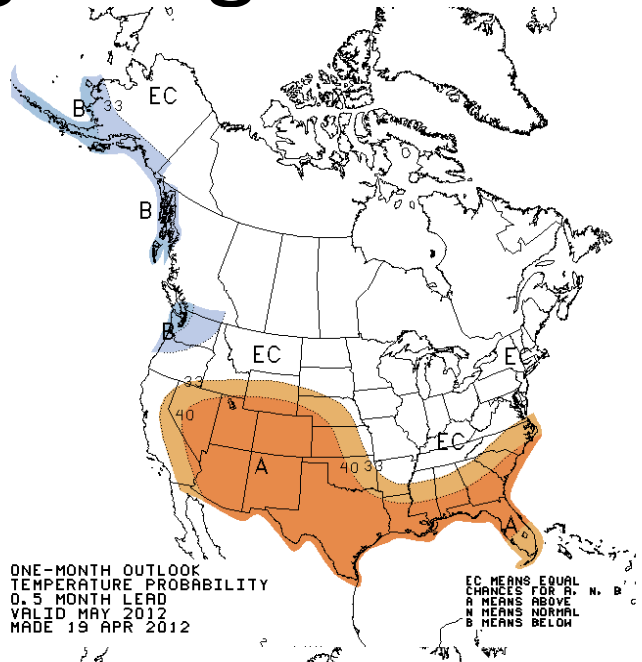
6-10 Day
4/30-5/4

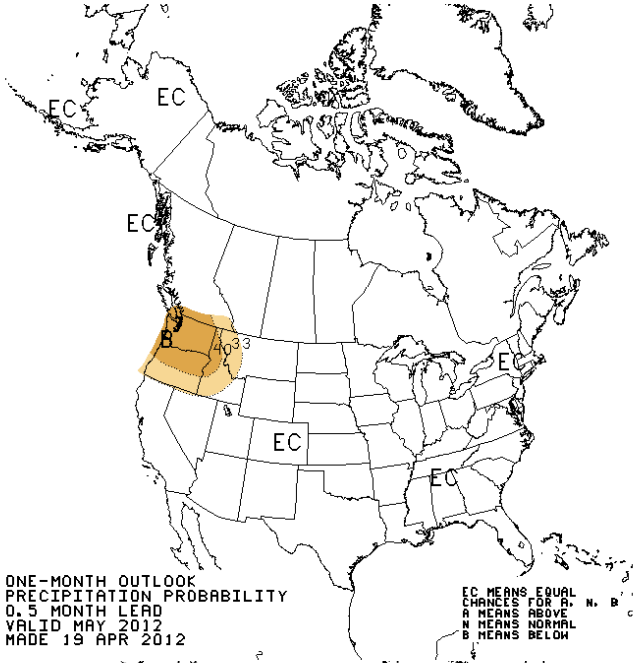


8-14 Day
5/2-5/8

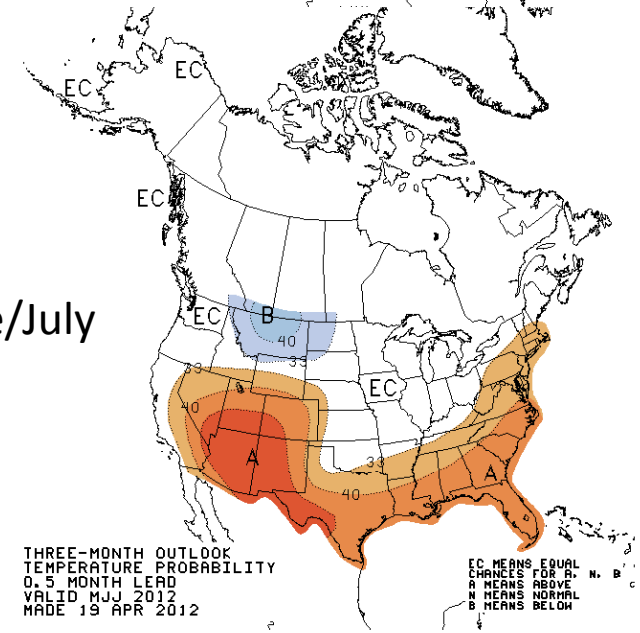
Long Range Climate Forecasts

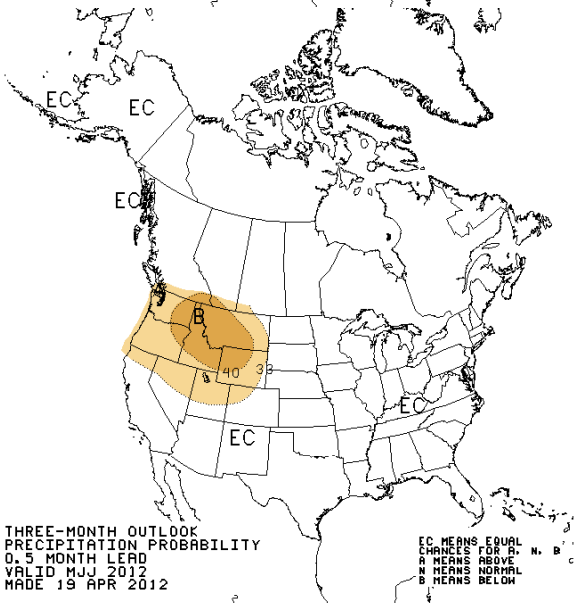
MAY





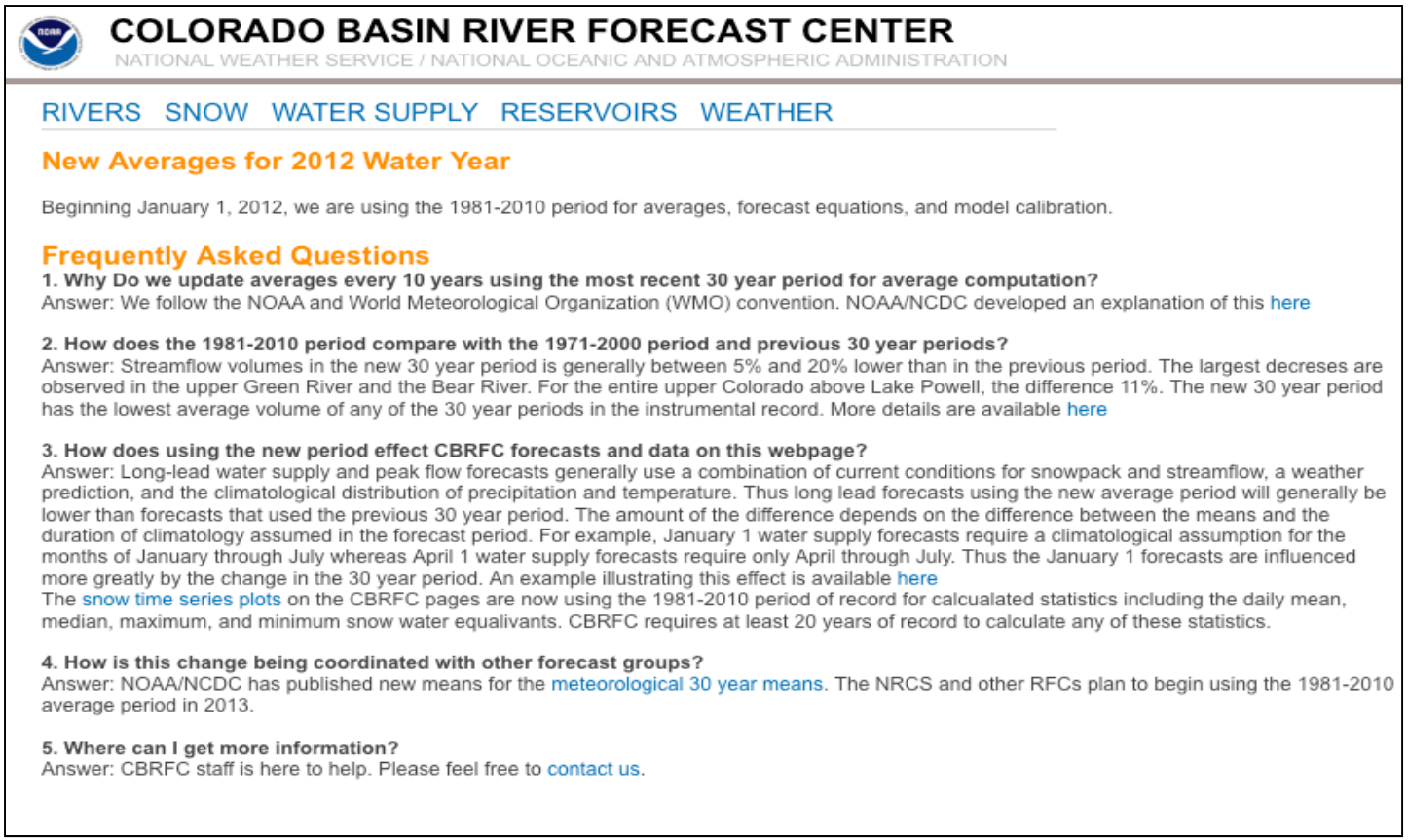
May/June/July





30 year Average Update

- 30 year averages are updated once every 10 years
- Prior to January, 2012:
  - 1971-2000 for averages
- Starting January 1st we are using the new 1981-2010 averages
- **Largest decreases in the Upper Green River Basin**
- Recalibration of 458 river basin modes to the 1981-2010 period



COLORADO BASIN RIVER FORECAST CENTER

NATIONAL WEATHER SERVICE / NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

RIVERS SNOW WATER SUPPLY RESERVOIRS WEATHER

New Averages for 2012 Water Year

Beginning January 1, 2012, we are using the 1981-2010 period for averages, forecast equations, and model calibration.

Frequently Asked Questions

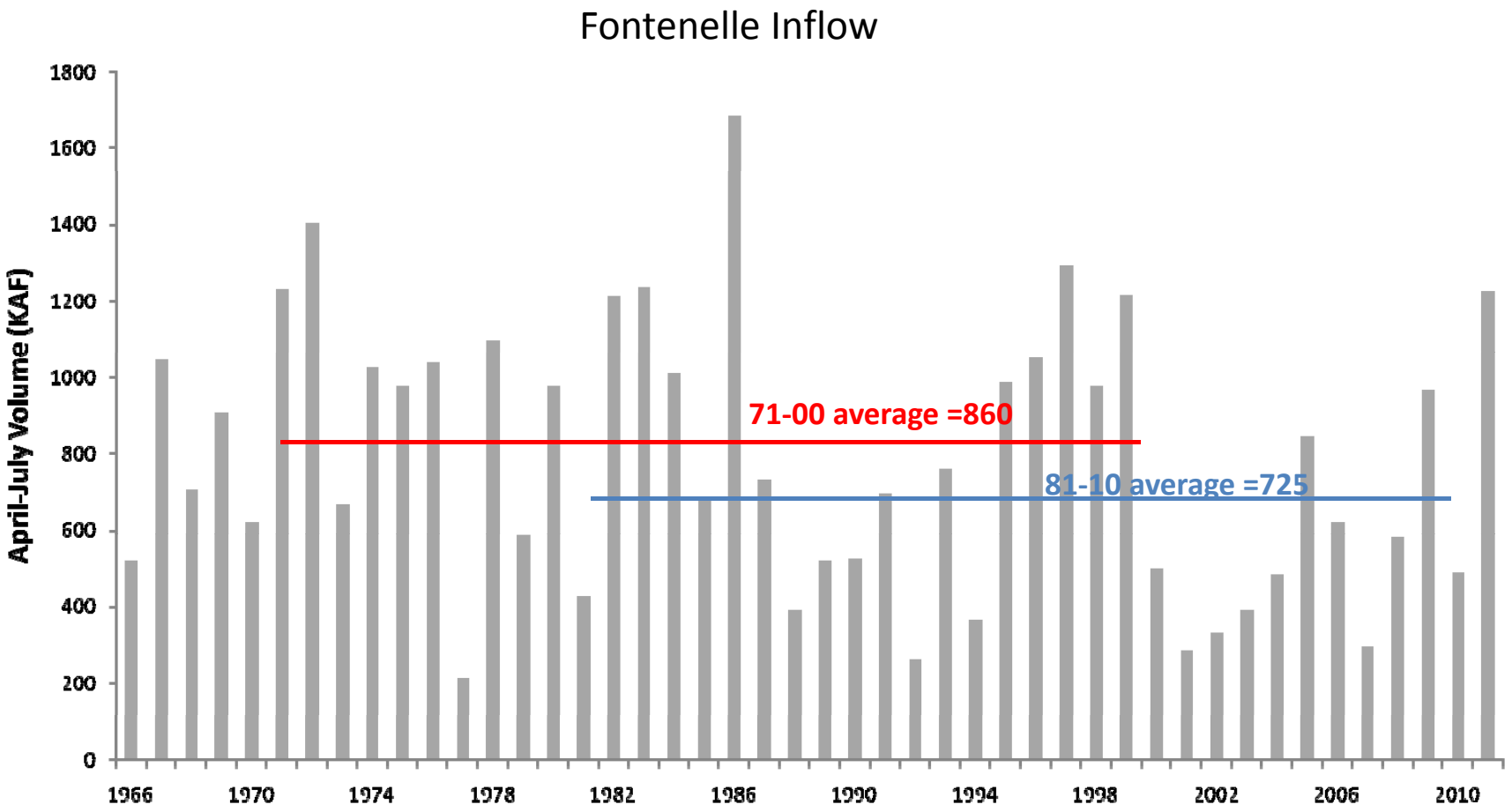
1. Why Do we update averages every 10 years using the most recent 30 year period for average computation?
Answer: We follow the NOAA and World Meteorological Organization (WMO) convention. NOAA/NCDC developed an explanation of this here

2. How does the 1981-2010 period compare with the 1971-2000 period and previous 30 year periods?
Answer: Streamflow volumes in the new 30 year period is generally between 5% and 20% lower than in the previous period. The largest decreses are observed in the upper Green River and the Bear River. For the entire upper Colorado above Lake Powell, the difference 11%. The new 30 year period has the lowest average volume of any of the 30 year periods in the instrumental record. More details are available here

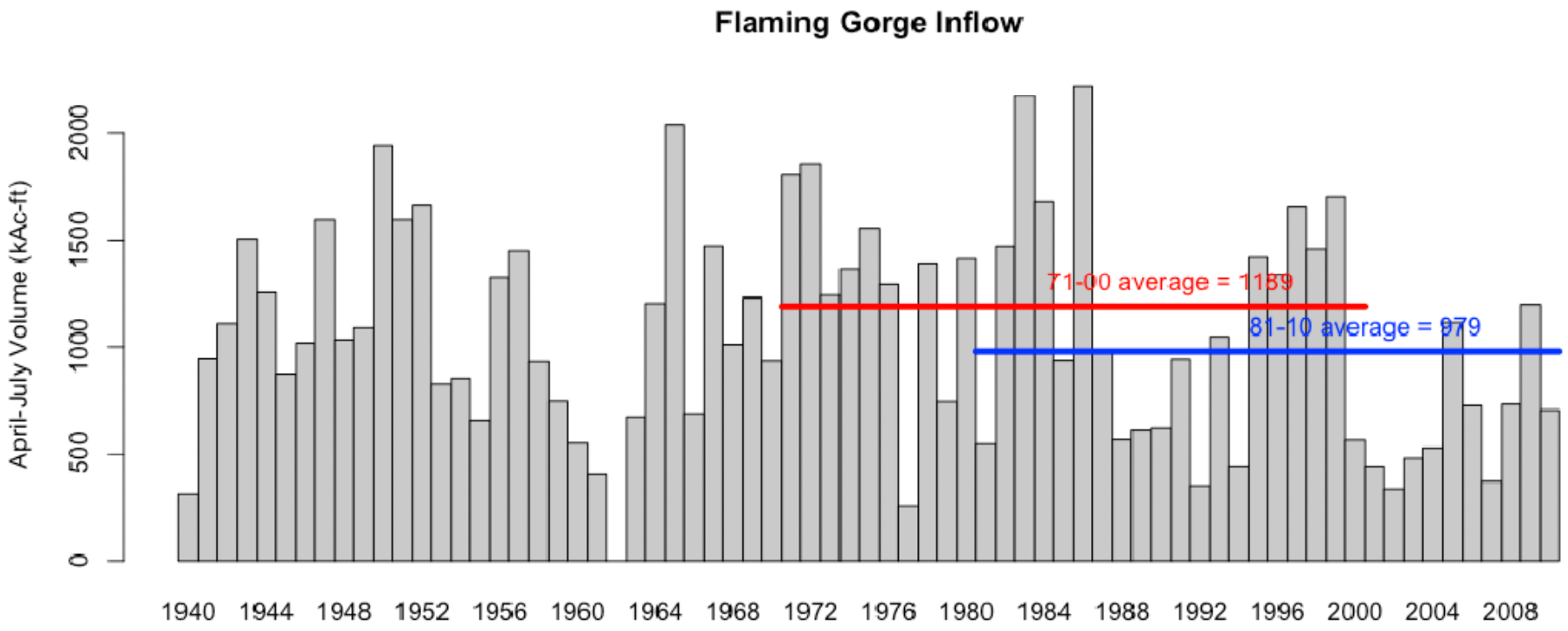
3. How does using the new period effect CBRFC forecasts and data on this webpage?
Answer: Long-lead water supply and peak flow forecasts generally use a combination of current conditions for snowpack and streamflow, a weather prediction, and the climatological distribution of precipitation and temperature. Thus long lead forecasts using the new average period will generally be lower than forecasts that used the previous 30 year period. The amount of the difference depends on the difference between the means and the duration of climatology assumed in the forecast period. For example, January 1 water supply forecasts require a climatological assumption for the months of January through July whereas April 1 water supply forecasts require only April through July. Thus the January 1 forecasts are influenced more greatly by the change in the 30 year period. An example illustrating this effect is available here
The snow time series plots on the CBRFC pages are now using the 1981-2010 period of record for calcualated statistics including the daily mean, median, maximum, and minimum snow water equalivants. CBRFC requires at least 20 years of record to calculate any of these statistics.

4. How is this change being coordinated with other forecast groups?
Answer: NOAA/NCDC has published new means for the meteorological 30 year means. The NRCS and other RFCs plan to begin using the 1981-2010 average period in 2013.

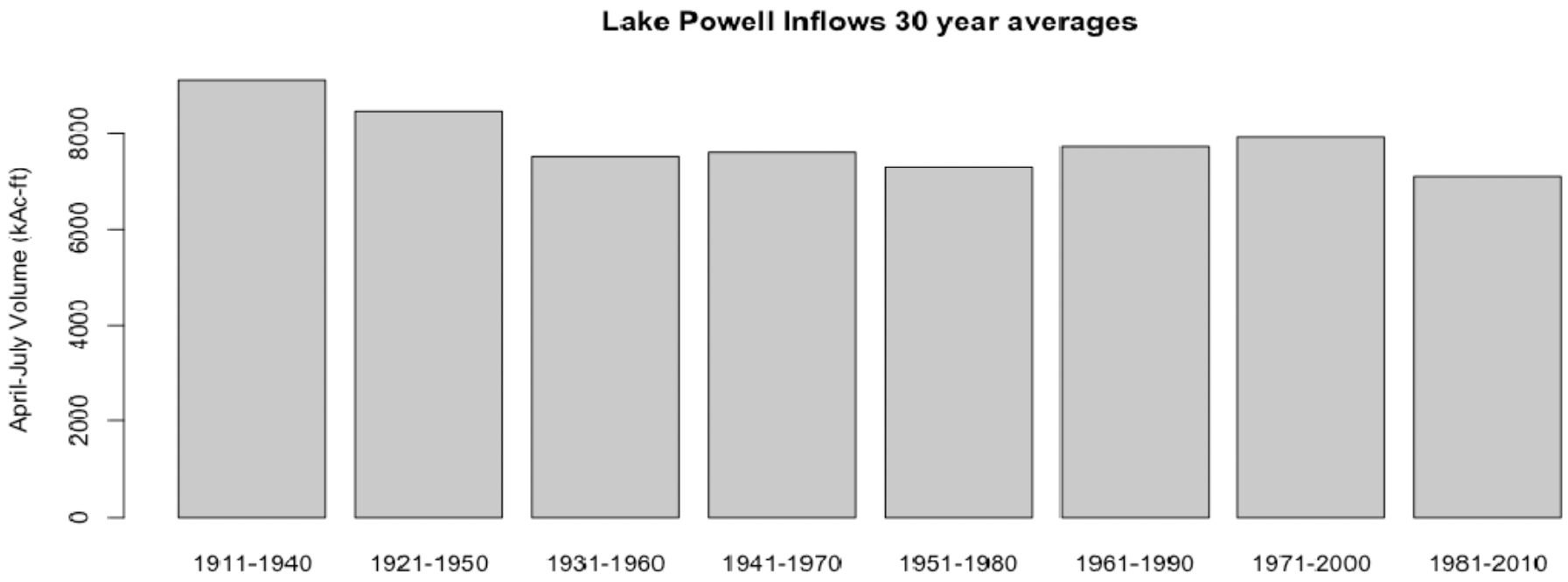
5. Where can I get more information?
Answer: CBRFC staff is here to help. Please feel free to contact us.



16% reduction in mean

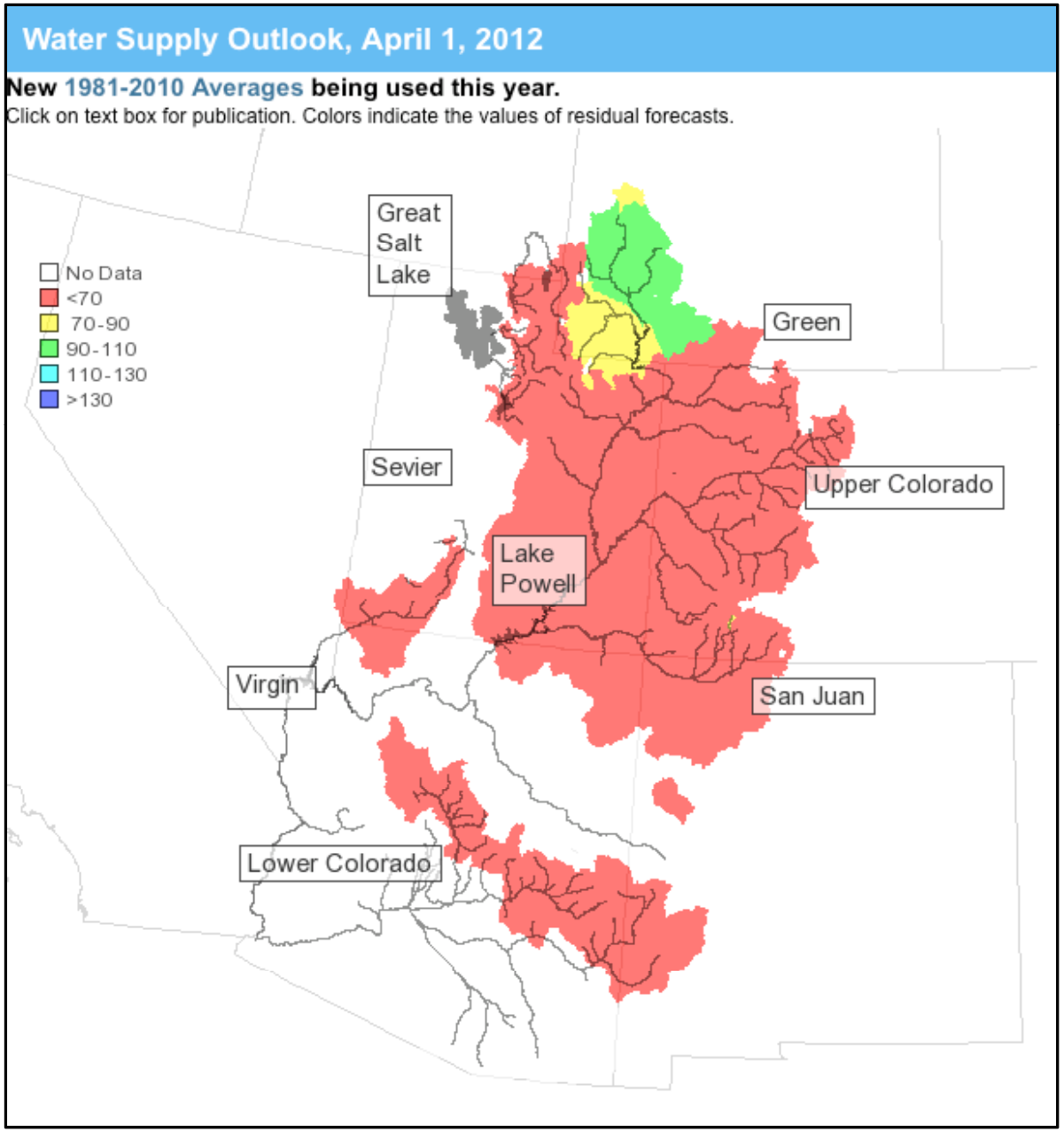


18% reduction in mean

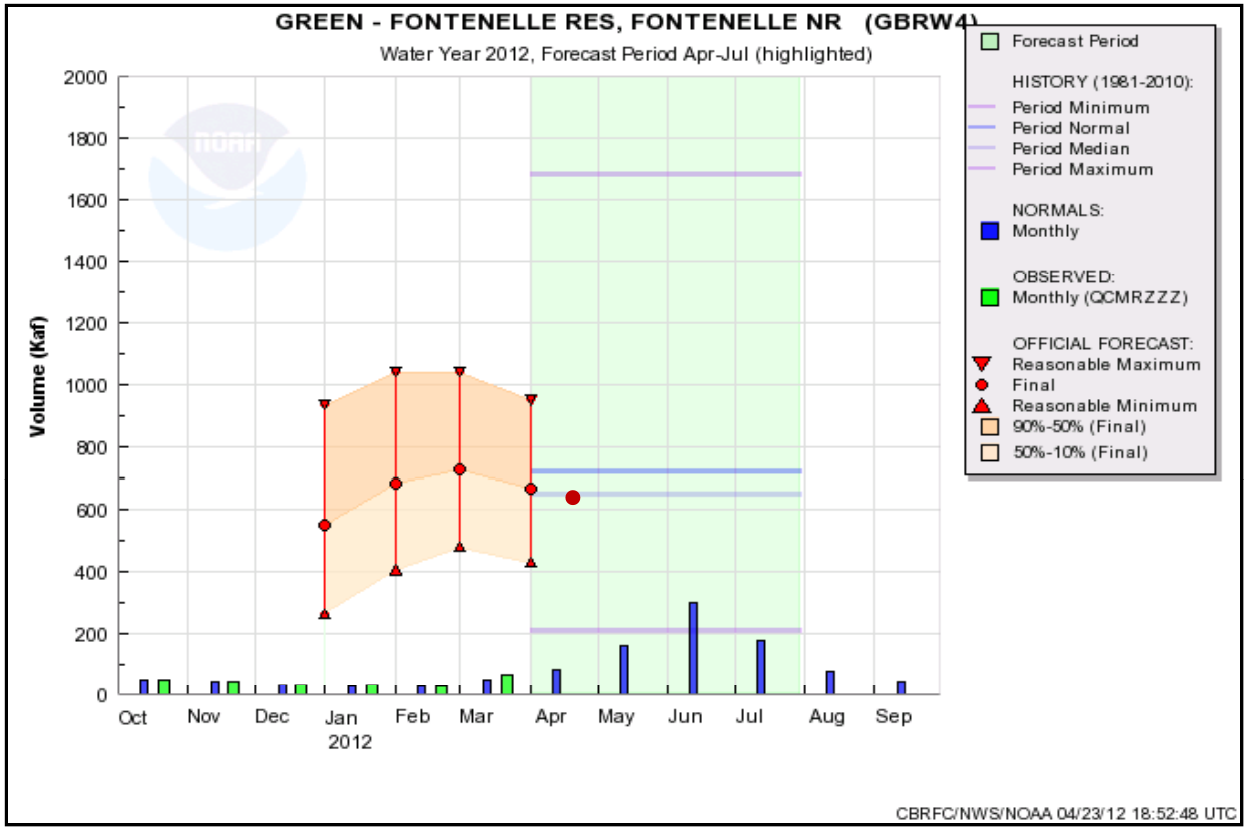


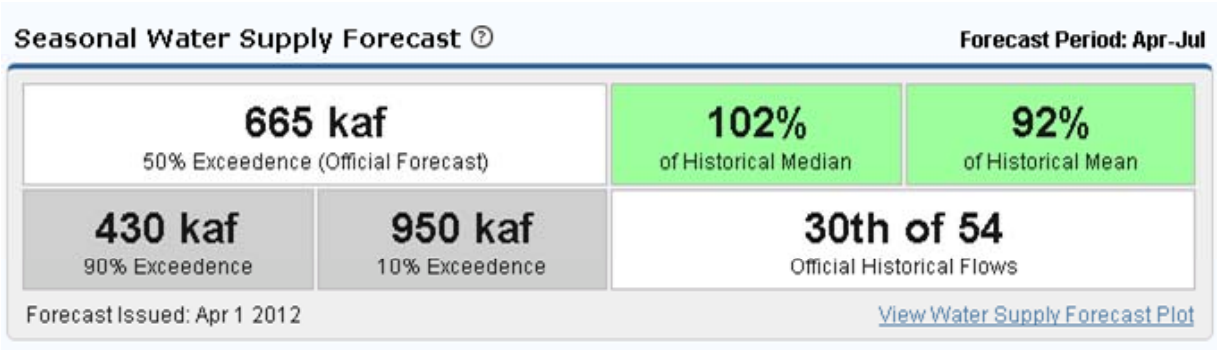
- 1981-2010 is the driest 30 year period on record

WATER SUPPLY FORECASTS



WATER SUPPLY FORECASTS





APRIL 16th Forecast:
645 KAF/89%

Questions/Comment?

Ashley Nielson

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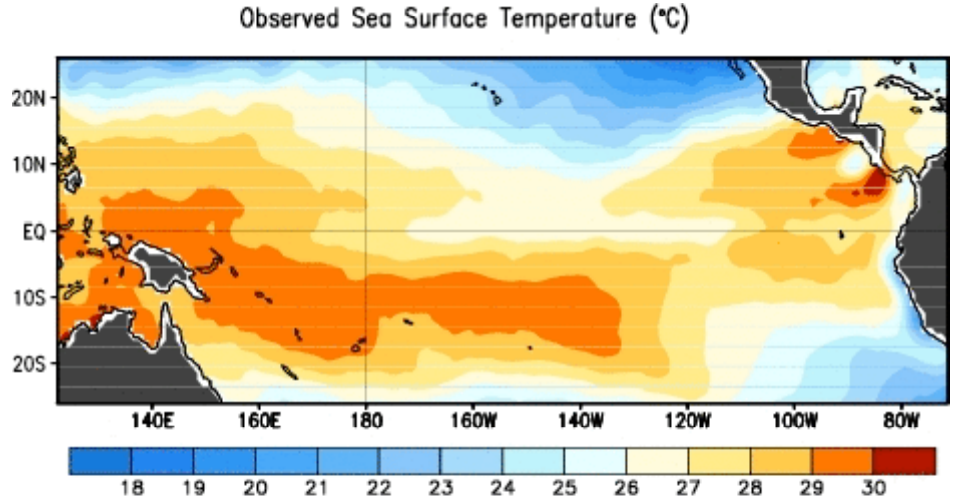
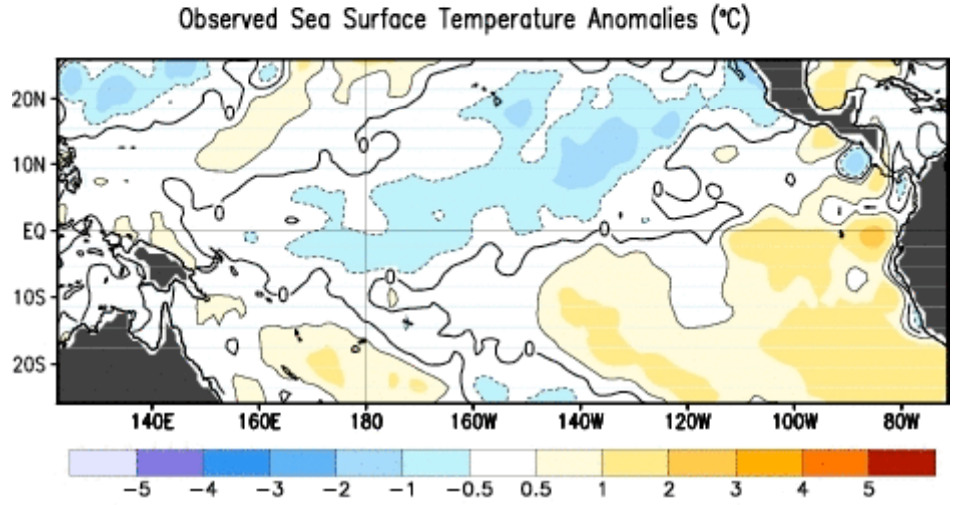
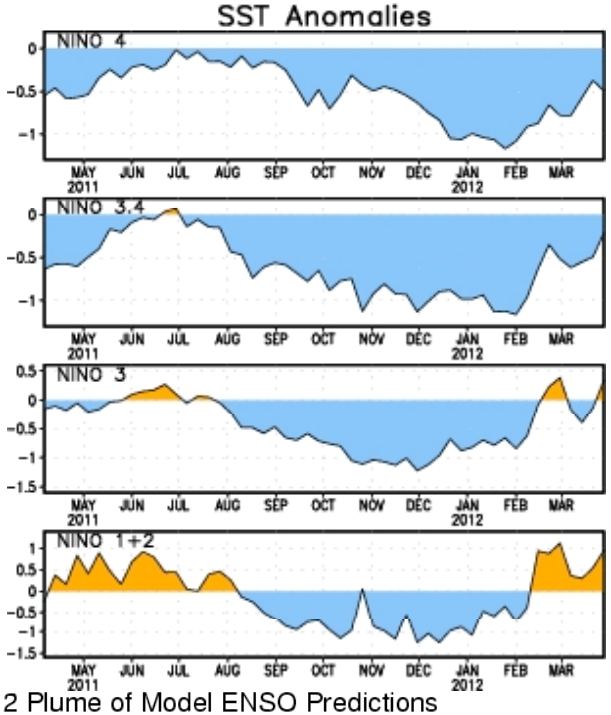
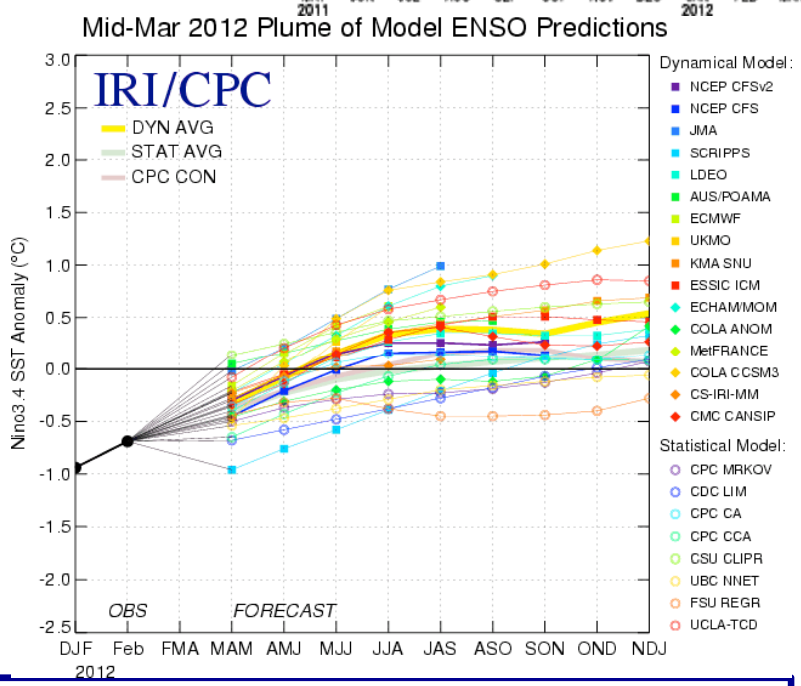
La Nina Update





7-day Average Centered on 28 March 2012

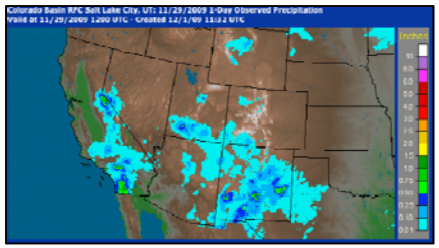




Web Reference: http://www.cpc.noaa.gov and iri.columbia.edu/climate/ENSO

How do we make forecasts?

Model Inputs/Outputs



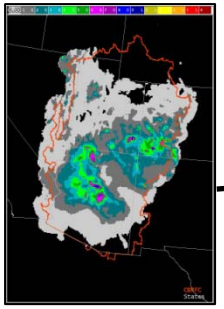
Precipitation Estimates

Radar Data

Satellite Data

River Gage Data

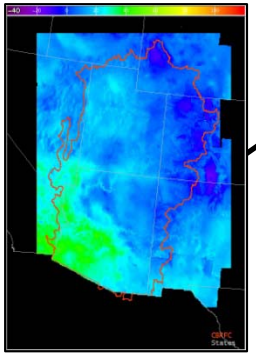
Reservoir Releases



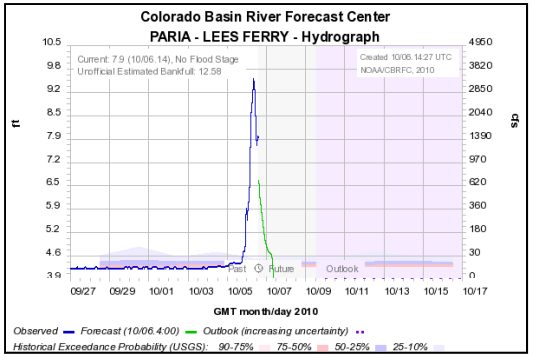
Precipitation Forecasts

HYDRO MODEL

Snow



Temperature Forecasts



Deterministic / Probabilistic River Forecasts

Quality of forecast depends on inputs !!

Water Supply:Two Methods

Statistical

- Regression equations, between measurements of observed climate conditions (predictor variables) and streamflow for a specific period.

- Predictors used by the CBRFC (Min 30 yrs of record).
  - Total precipitation (for a month or period of months)
  - First of month snow water equivalent (SNOTEL data)
  - Monthly flow volume
  - Climate Signals: El Nino Southern Oscillation Index (SOI)

Ensemble Streamflow Prediction

- Continuous, conceptual, hydrologic model