Great Basin
April 2016
Water Supply Briefing

1 pm April 7, 2016

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Colorado Basin River Forecast Center
National Weather Service
NOAA

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

* Please mute your phone until you have a question-Thank You *

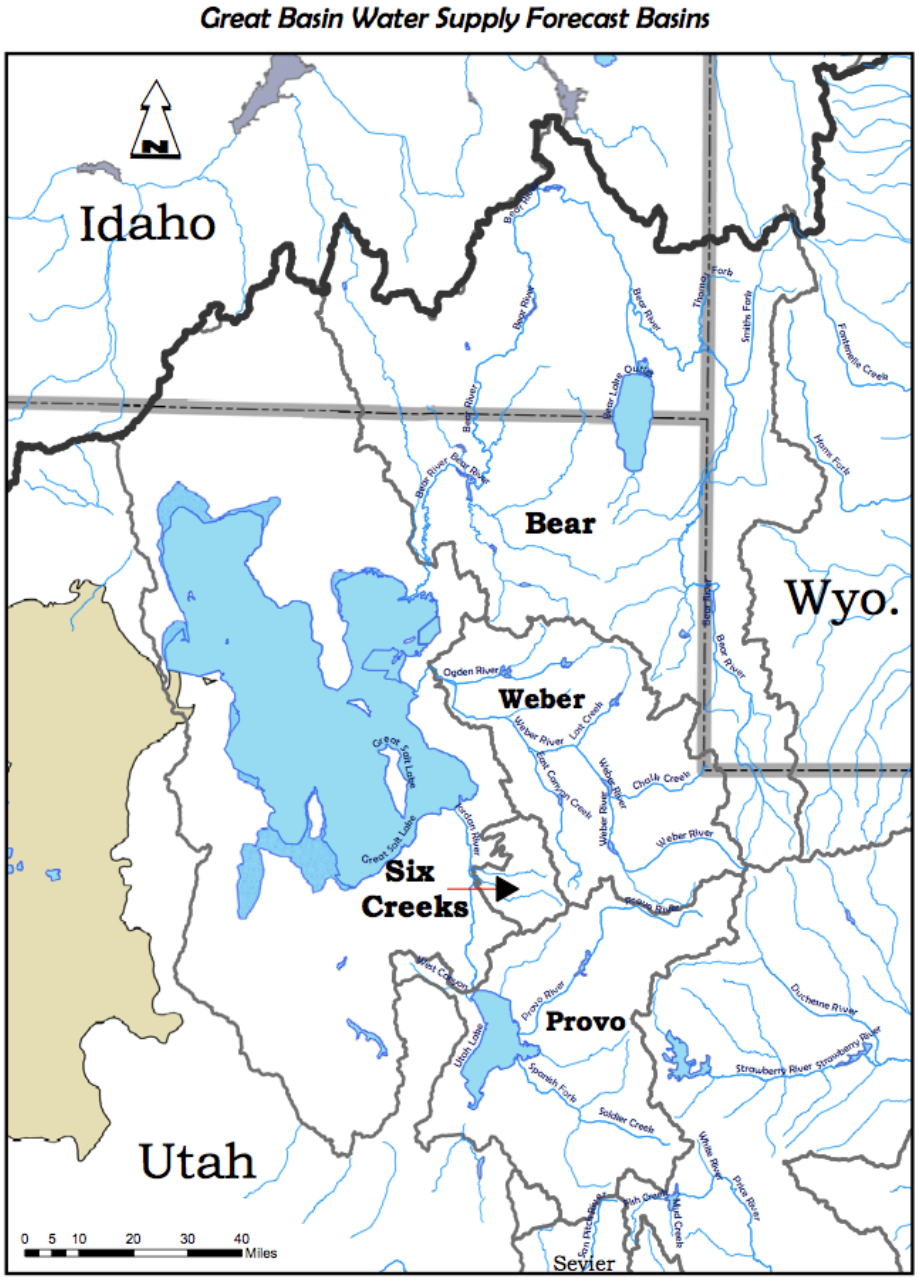
Great Basin Water Supply Briefing:

Primary focus is on the Bear, Weber, Six-Creeks, Provo/UT Lake river basins.

We can add the Sevier River Basin if there is interest.

We have a separate Colorado River Basin water supply briefing.

Feedback on these briefings is welcome and appreciated.

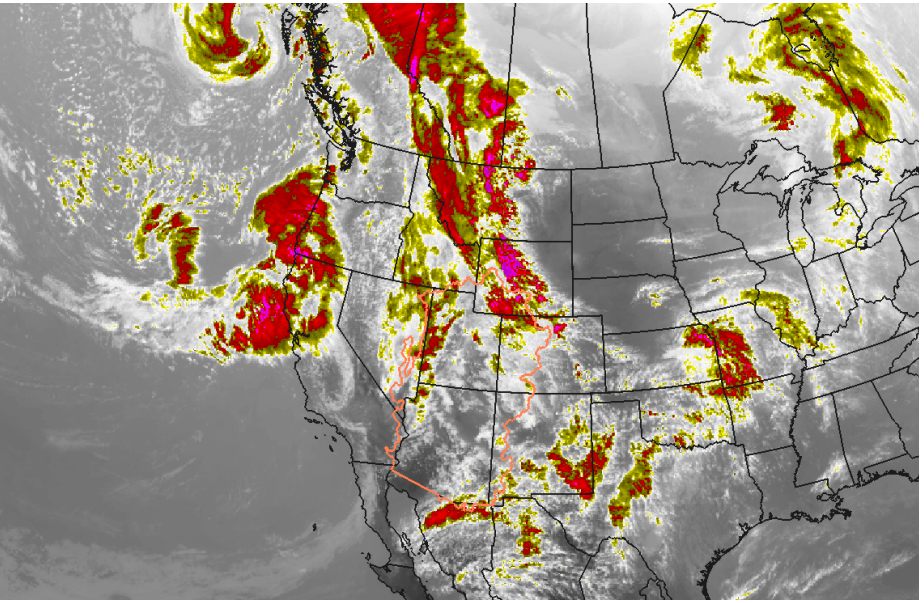


Today's Presentation – Questions to Answer

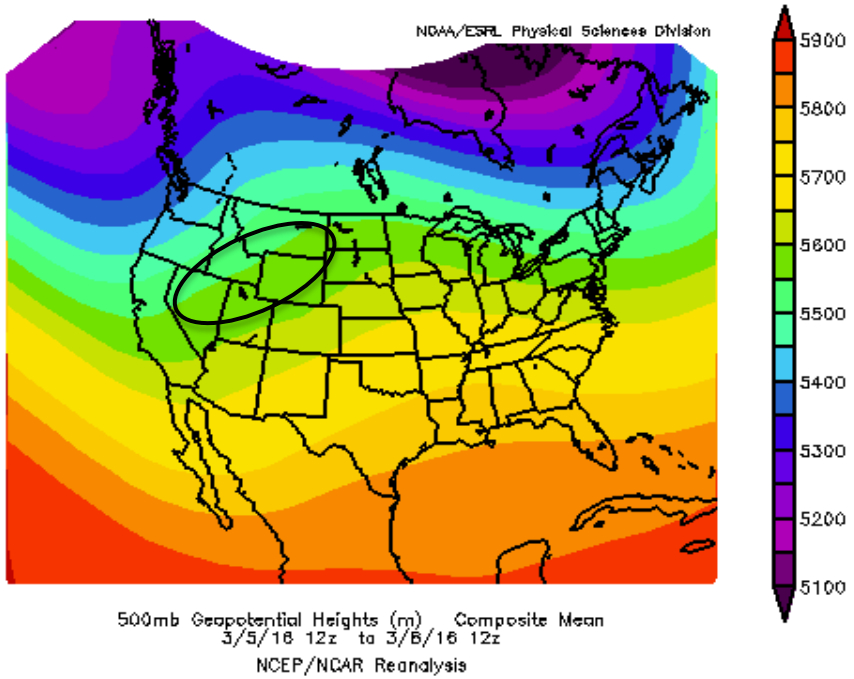
- **Some forecast increased, others decreased, how beneficial were the March storms ?**
  - March weather pattern.
  - March and water year precipitation.
  - Where snowpack conditions improved or worsened.
- **Trend in the water supply forecasts between last month and this month**
- **The water supply outlook / forecasts**
  - Bear, Weber, Six-Creeks, Provo conditions and forecasts.
  - What are the chances for average runoff conditions.
  - How good are forecasts in early April?
- **Brief updated peak flow forecast summary.**
- **Upcoming weather – It looks Active!**
- **El Niño and the long range outlook.**

March 2016 Weather Pattern

March 6th satellite image



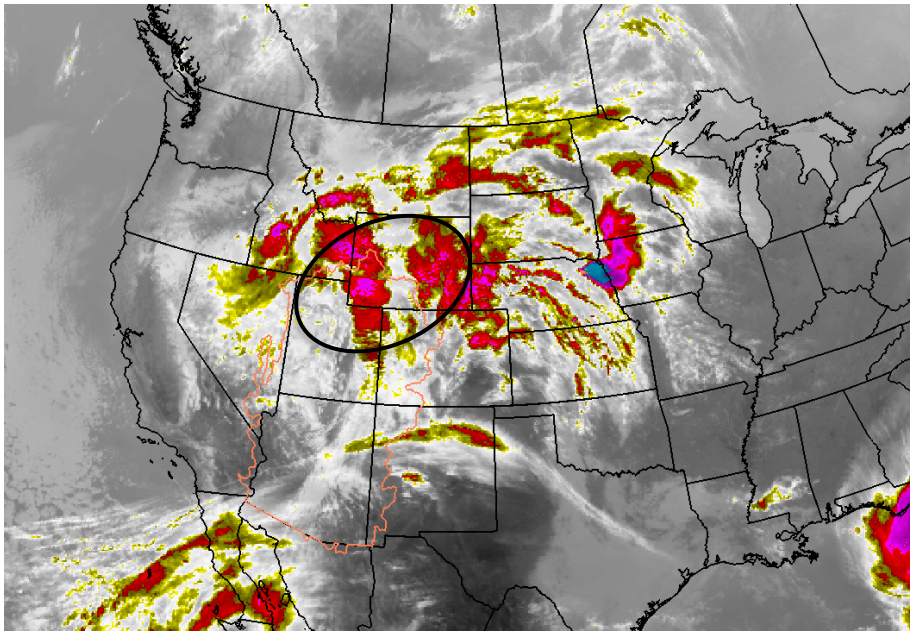
March 5th- 8th upper atmosphere pattern



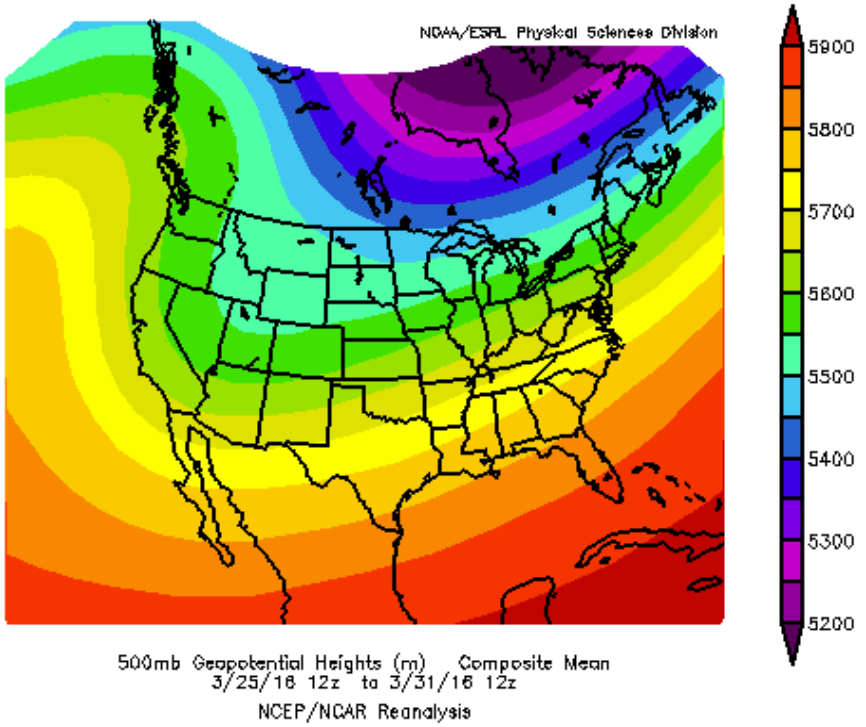
March was active however primary impacts were in the northern areas

March 2016 Weather Pattern

March 29th satellite image

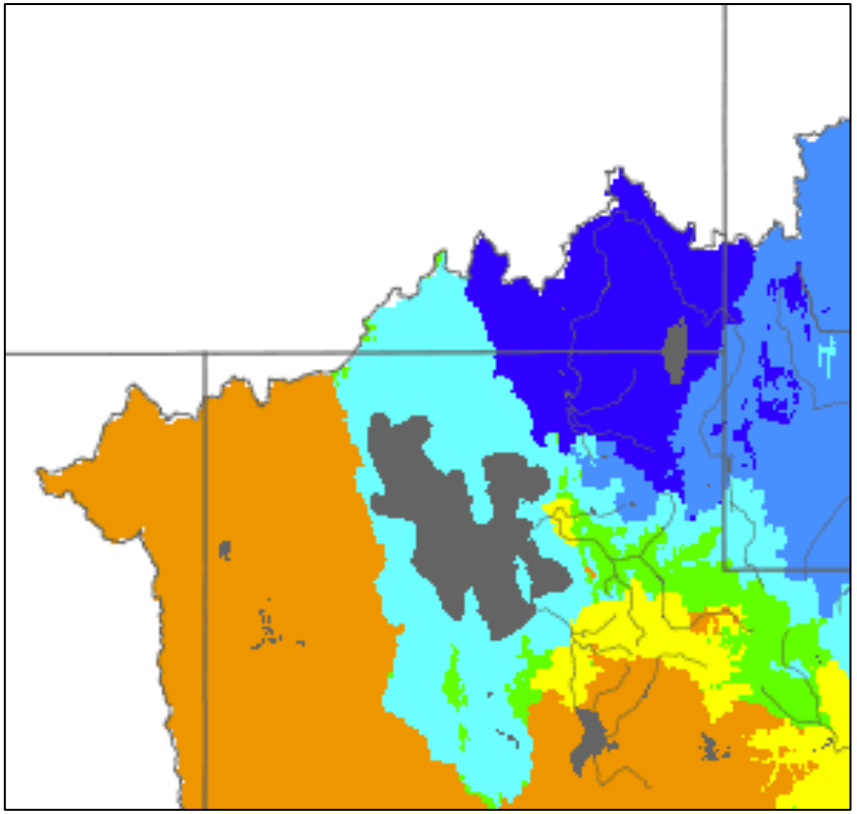


March 25th- 31st upper atmosphere pattern

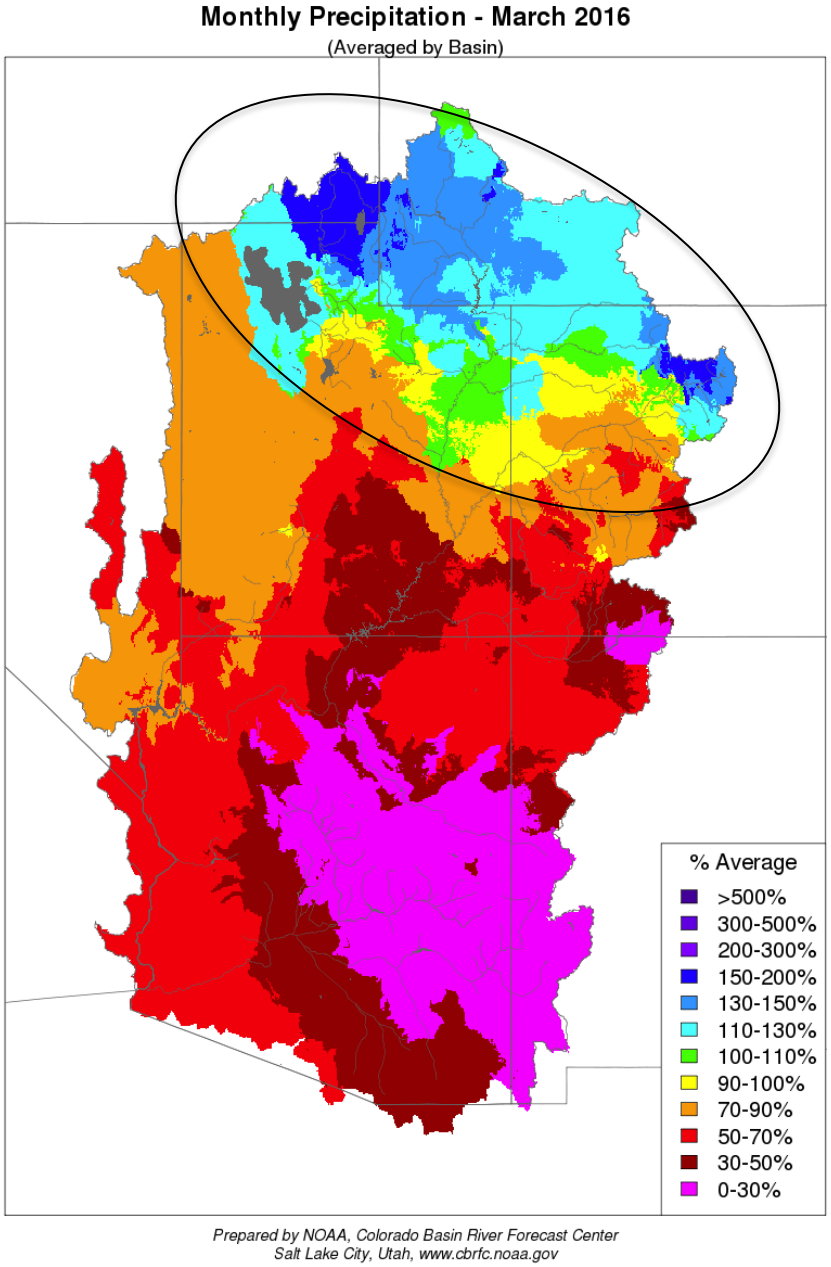


Large slow moving system at the end of March improved snow conditions at several northern locations

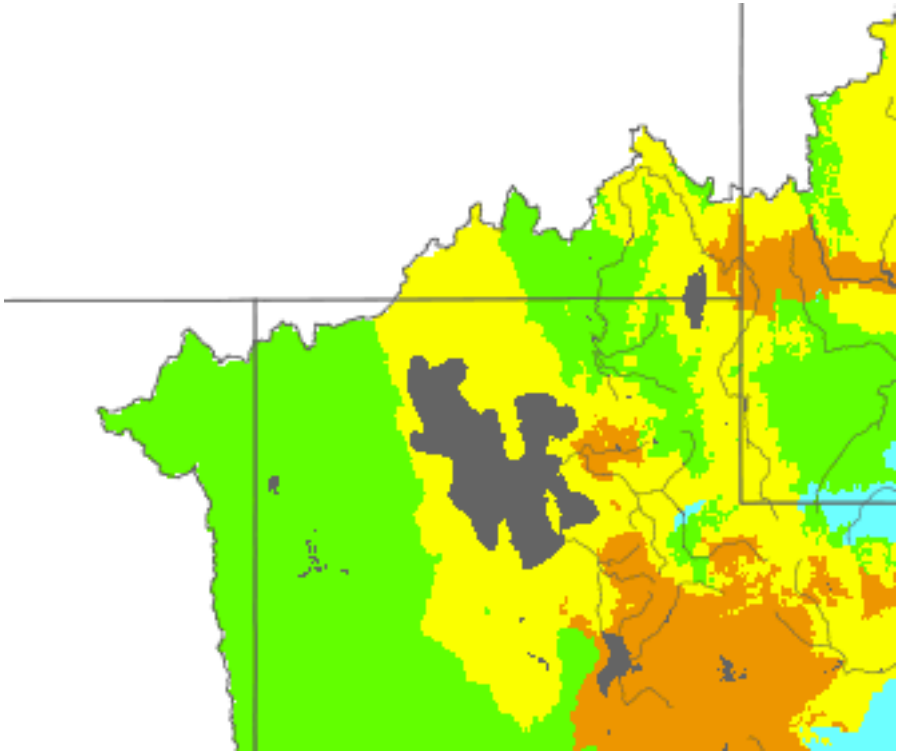
March 2016 Precipitation



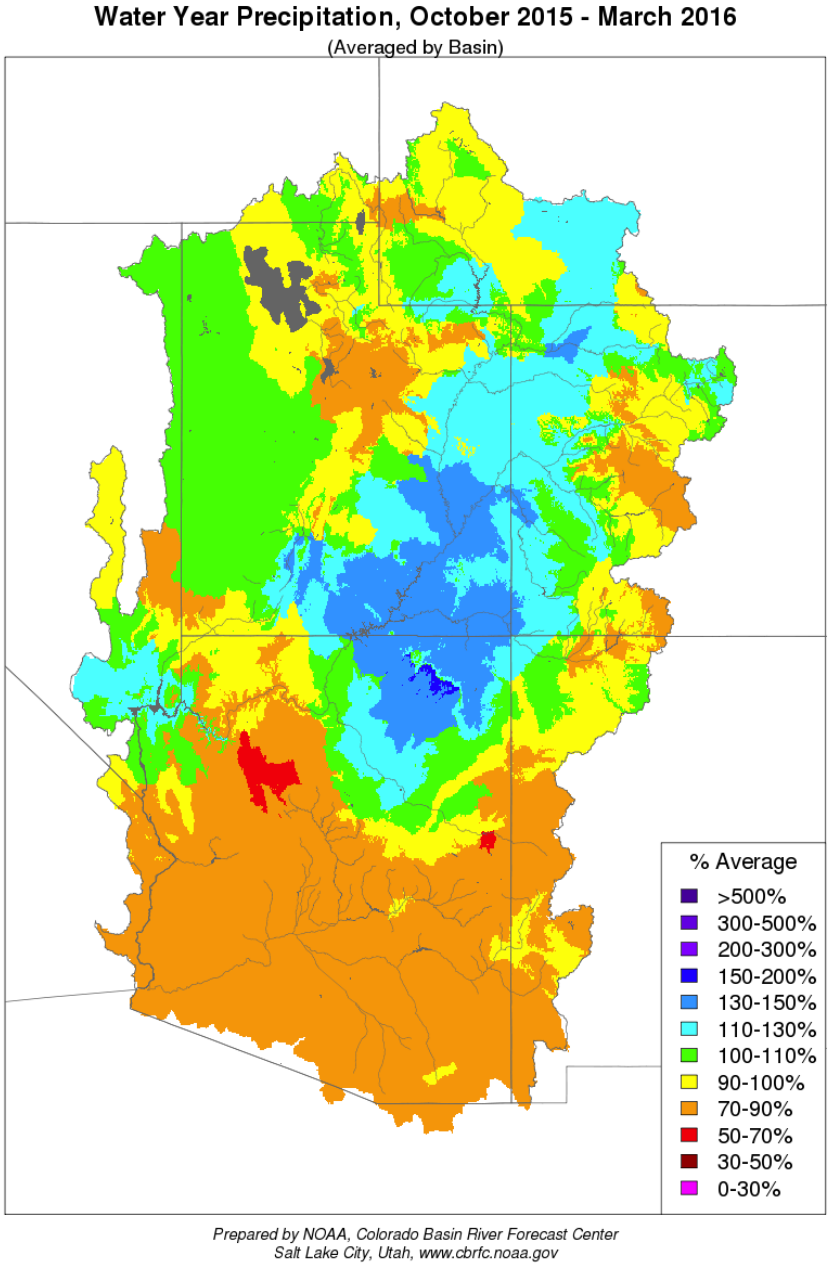
Bear :	155%
Weber:	110%
Six Creeks:	95%
Provo/UT Lake:	85%



Water-Year (Oct-Mar) 2016 Precipitation

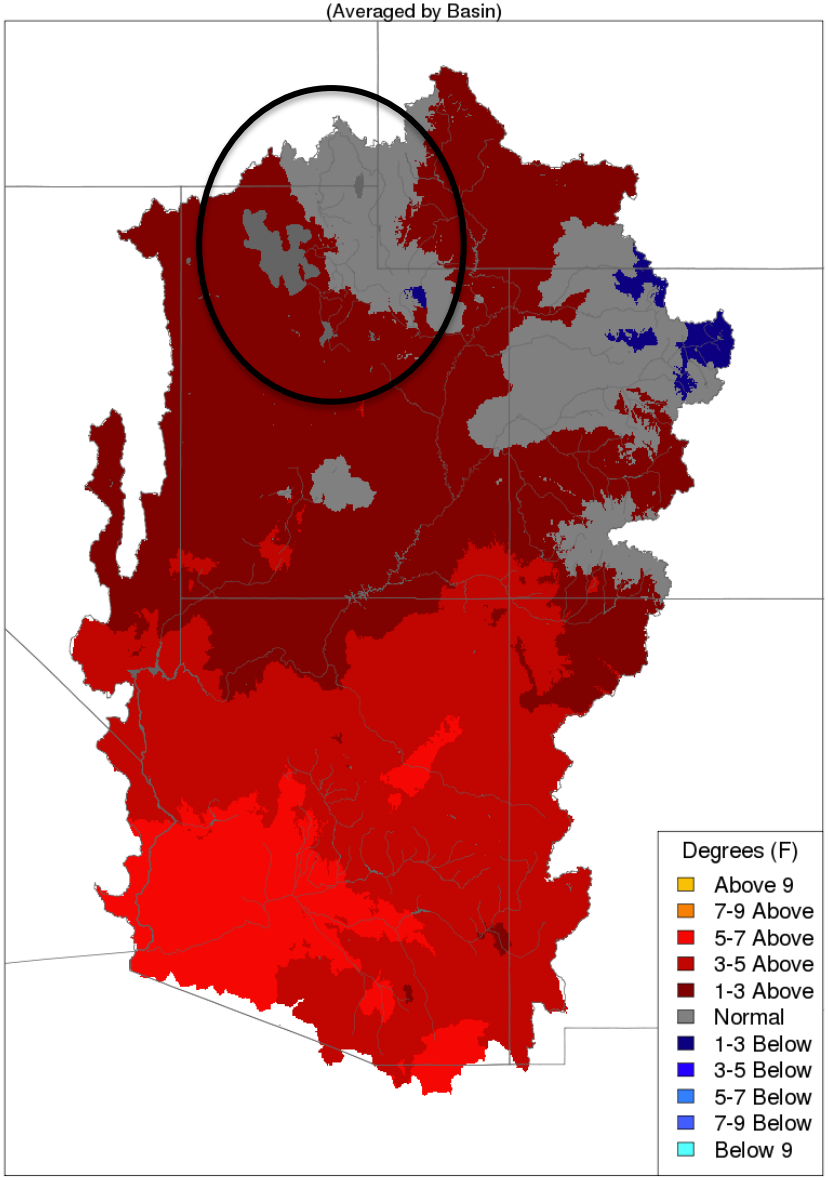


Bear :	100%
Weber:	95%
Six Creeks:	85%
Provo/UT Lake:	85%



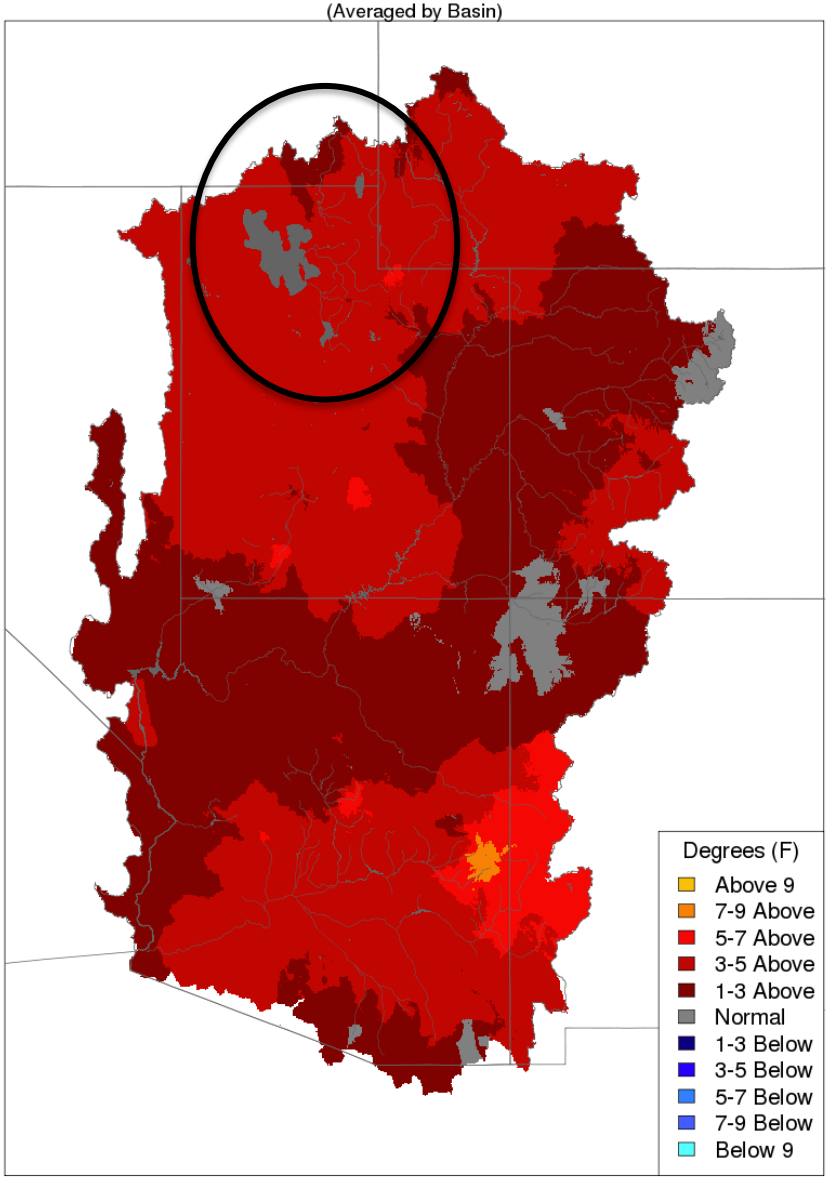
March 2016 Temperatures

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



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

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

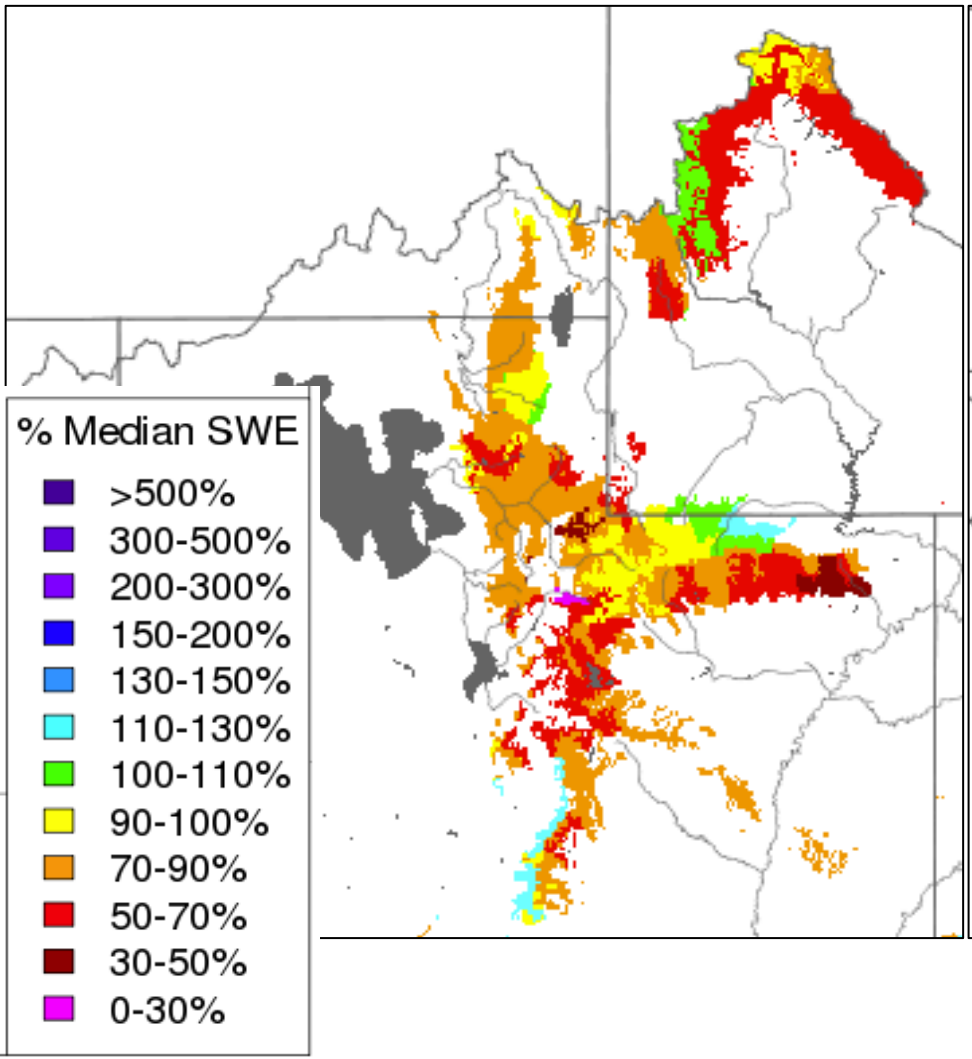


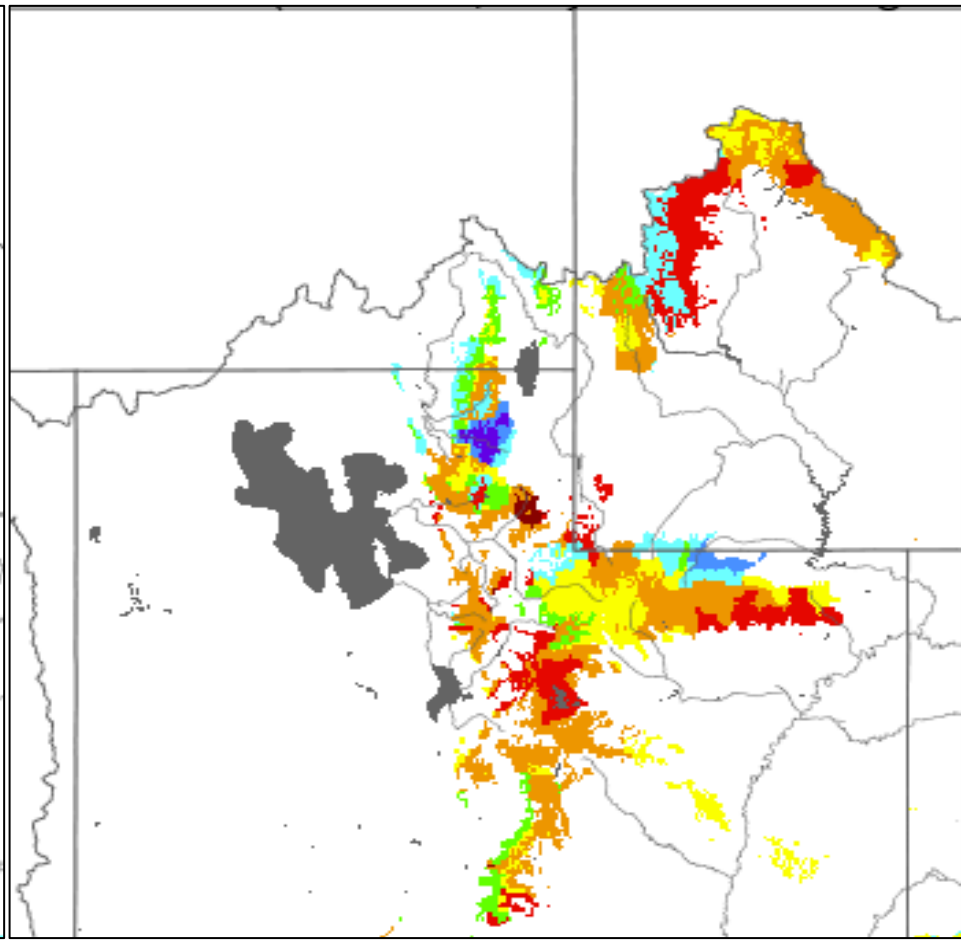
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Snow - CBRFC Hydrologic Model

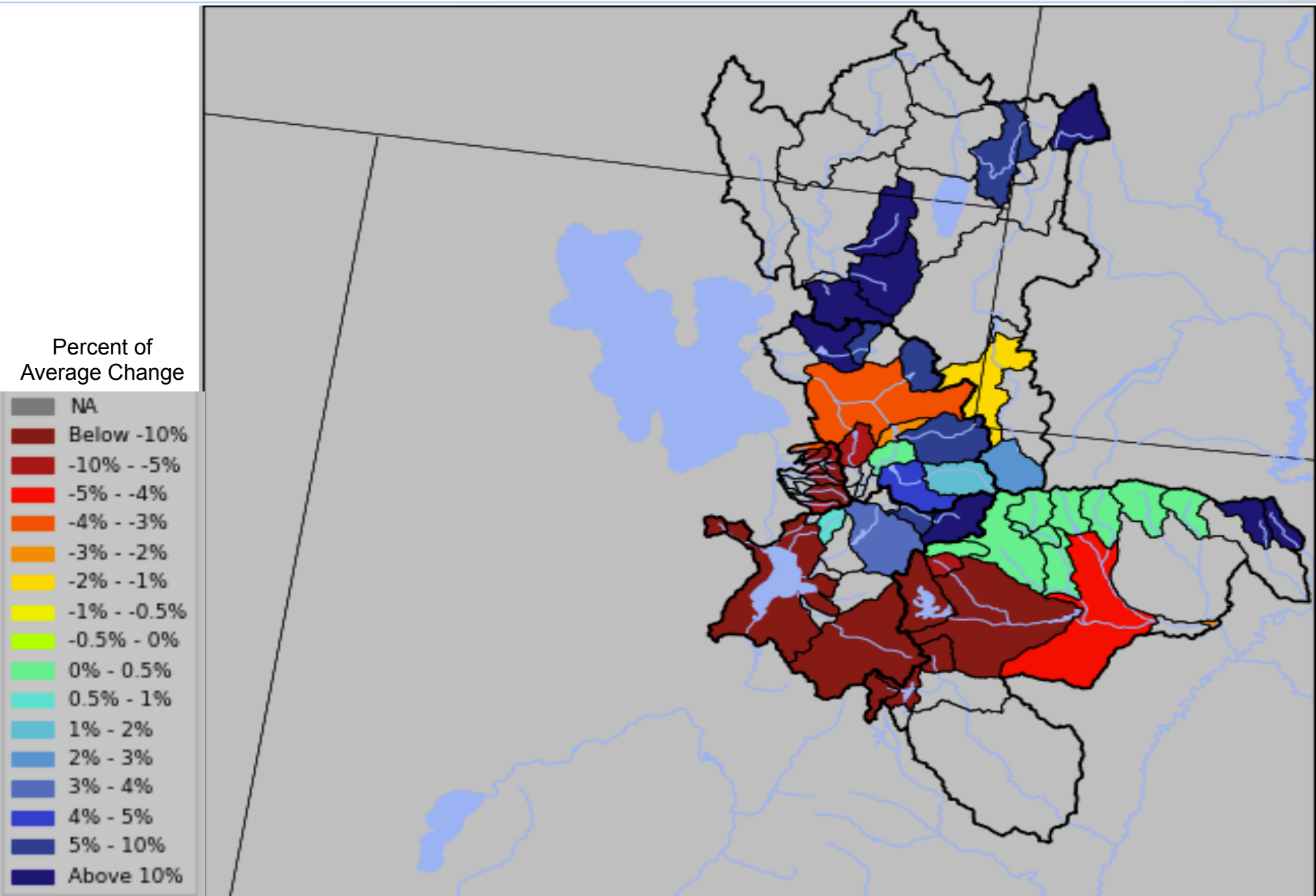
March 6th 2016
Significant Runoff Areas

April 6th 2016
Significant Runoff Areas

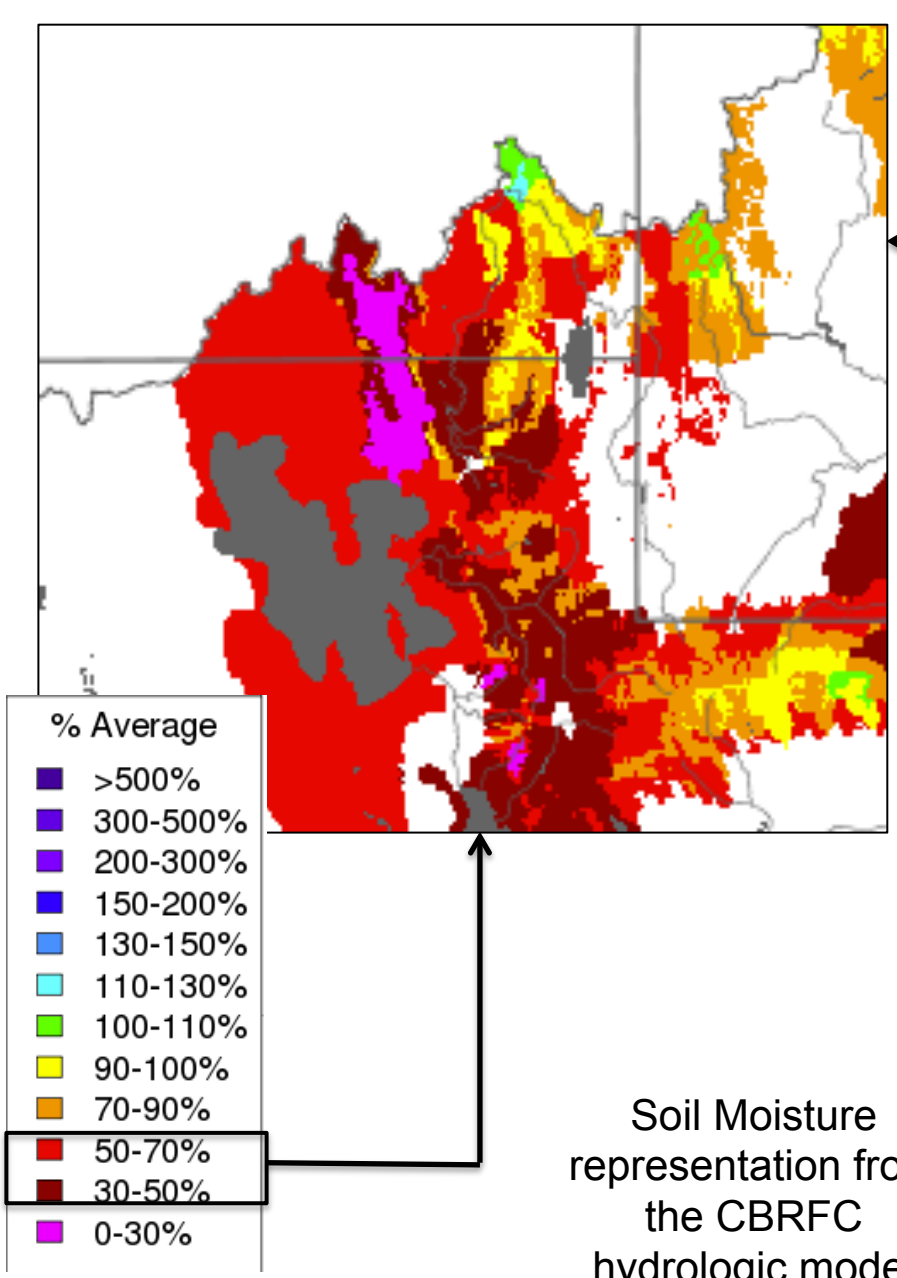




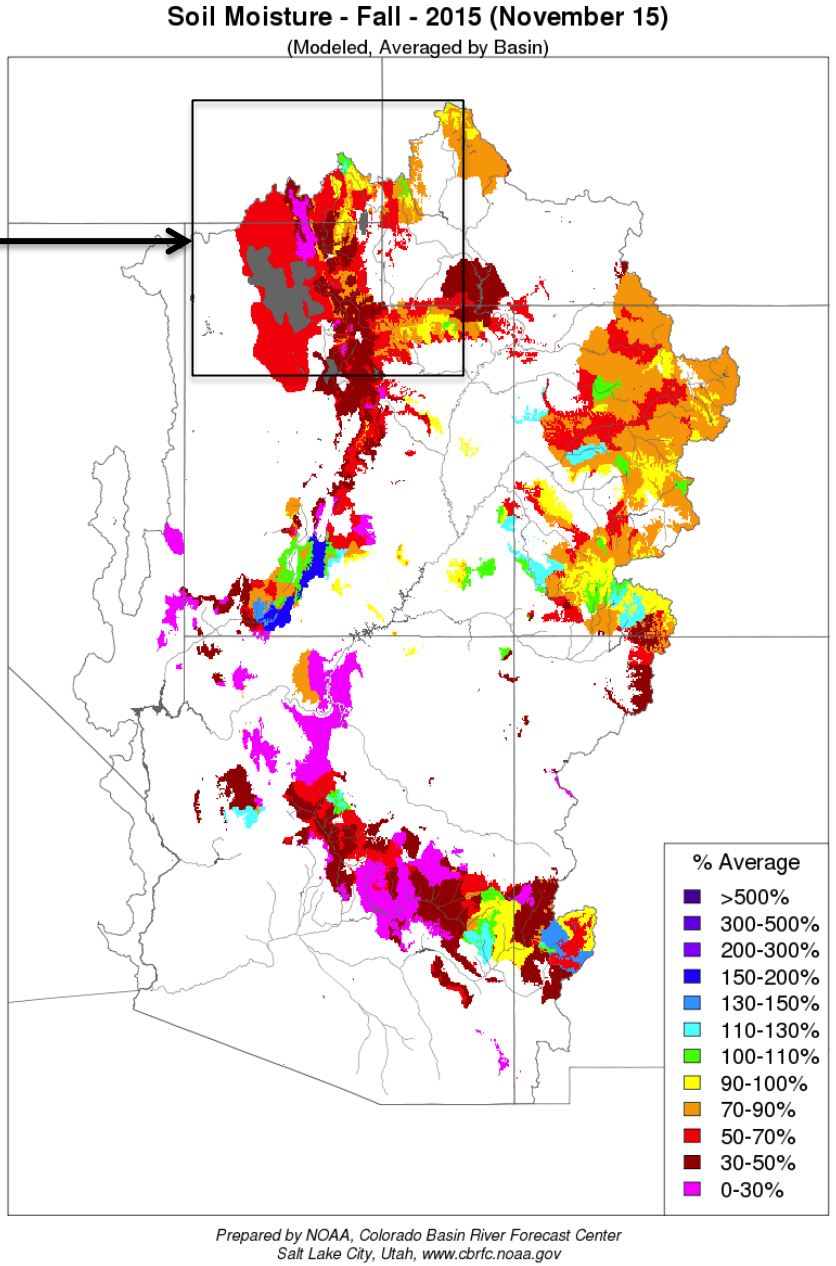
Water Supply Forecast Trend – March 1st to April 1st



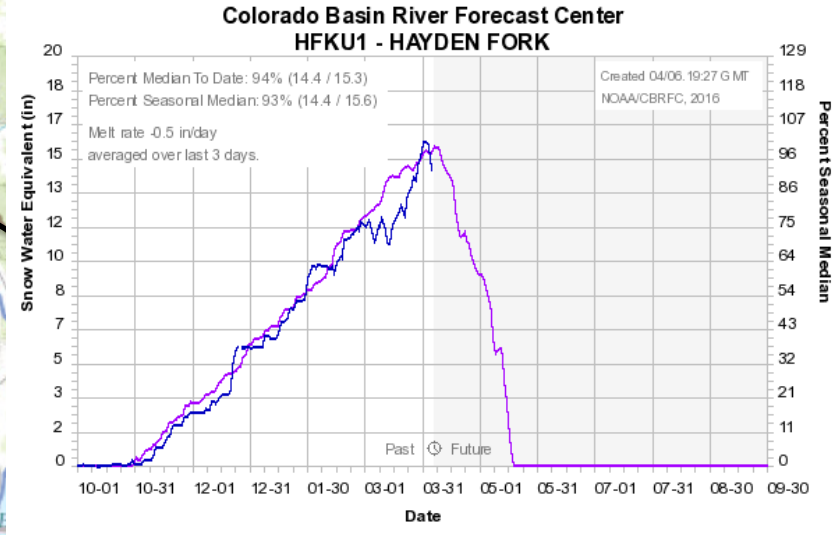
Model soil moisture conditions entering the winter

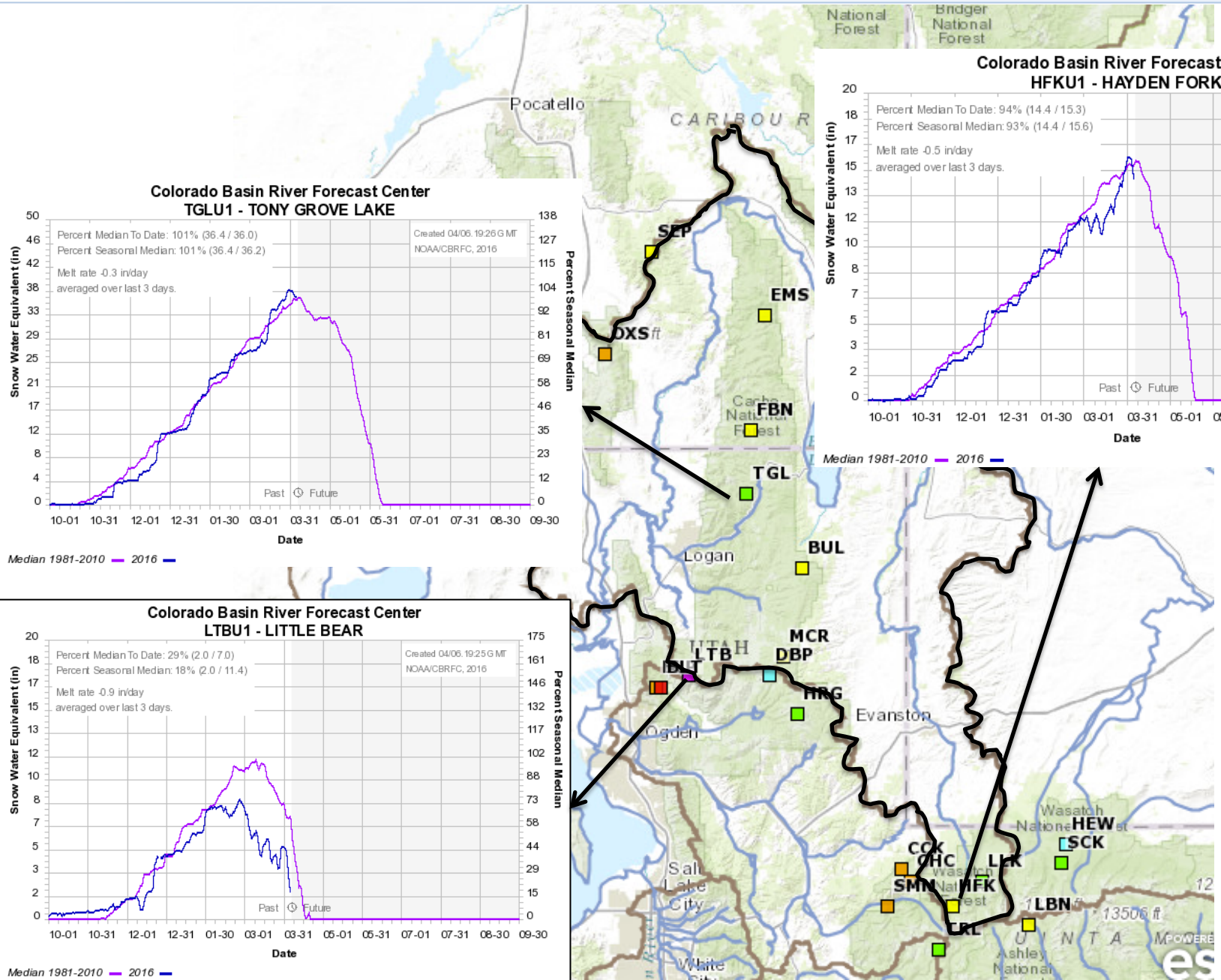


Soil Moisture representation from the CBRFC hydrologic model



Bear River Basin: April 6th SNOTEL (percent of median)

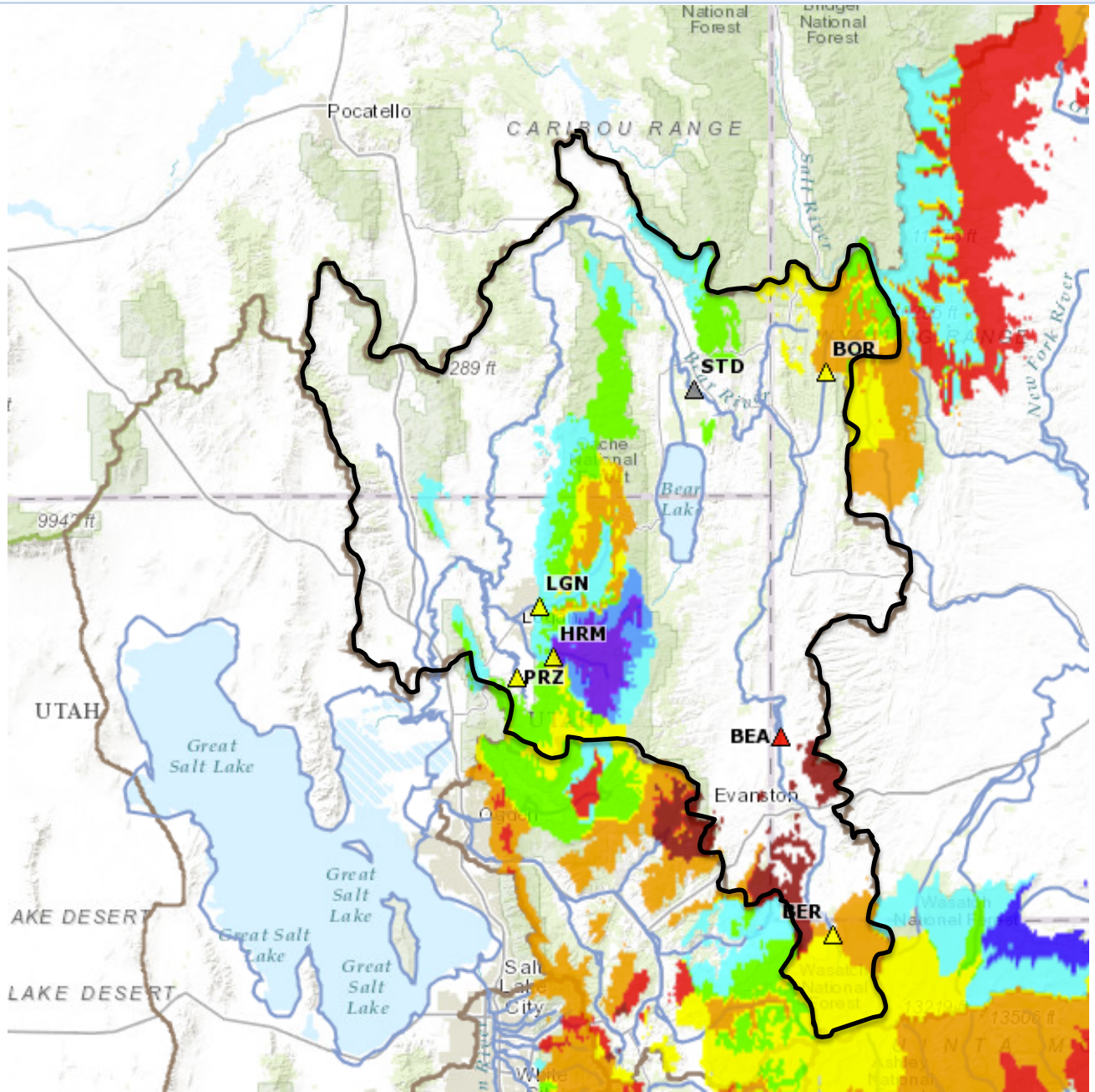




SNOTEL
Percent of Median

- No Data
- < 30%
- 30-50%
- 50-70%
- 70-90%
- 90-100%
- 100-110%
- 110-130%
- 130-150%
- 150-200%
- 200-300%
- 300-500
- >500%

Bear River Basin: CBRFC Model Snow – April 6th



Water supply forecast point

(% average Forecast)

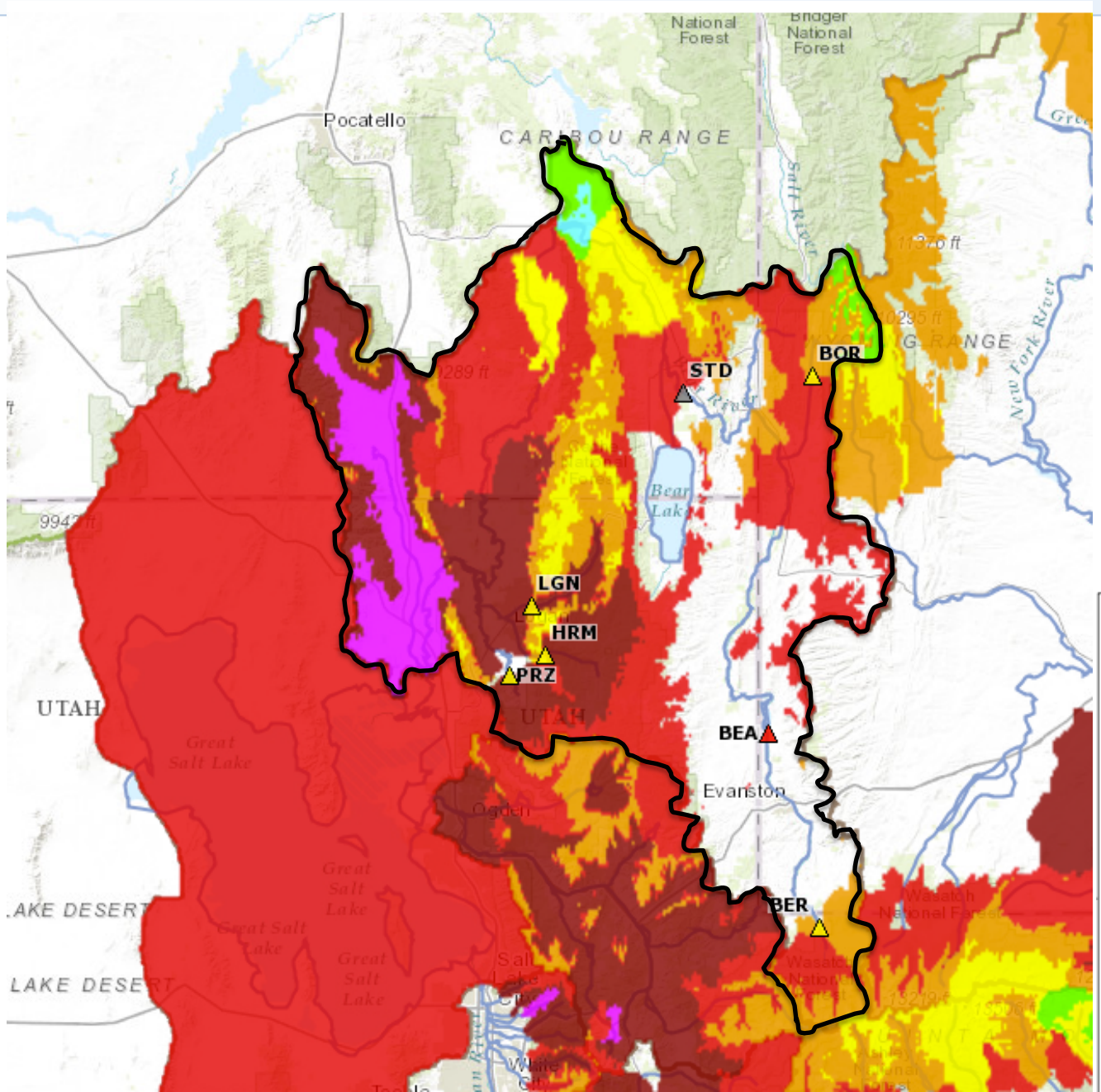
- < 70%
- 70-90%
- 90-110%
- 110-130%
- >130%
- Regulated
- No Forecast

CBRFC Model Snow

% Median SWE

- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%

Bear River Basin: CBRFC Model soil moisture entering winter



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CBRFC Model Soil Moisture

% Normal

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- 90-100%
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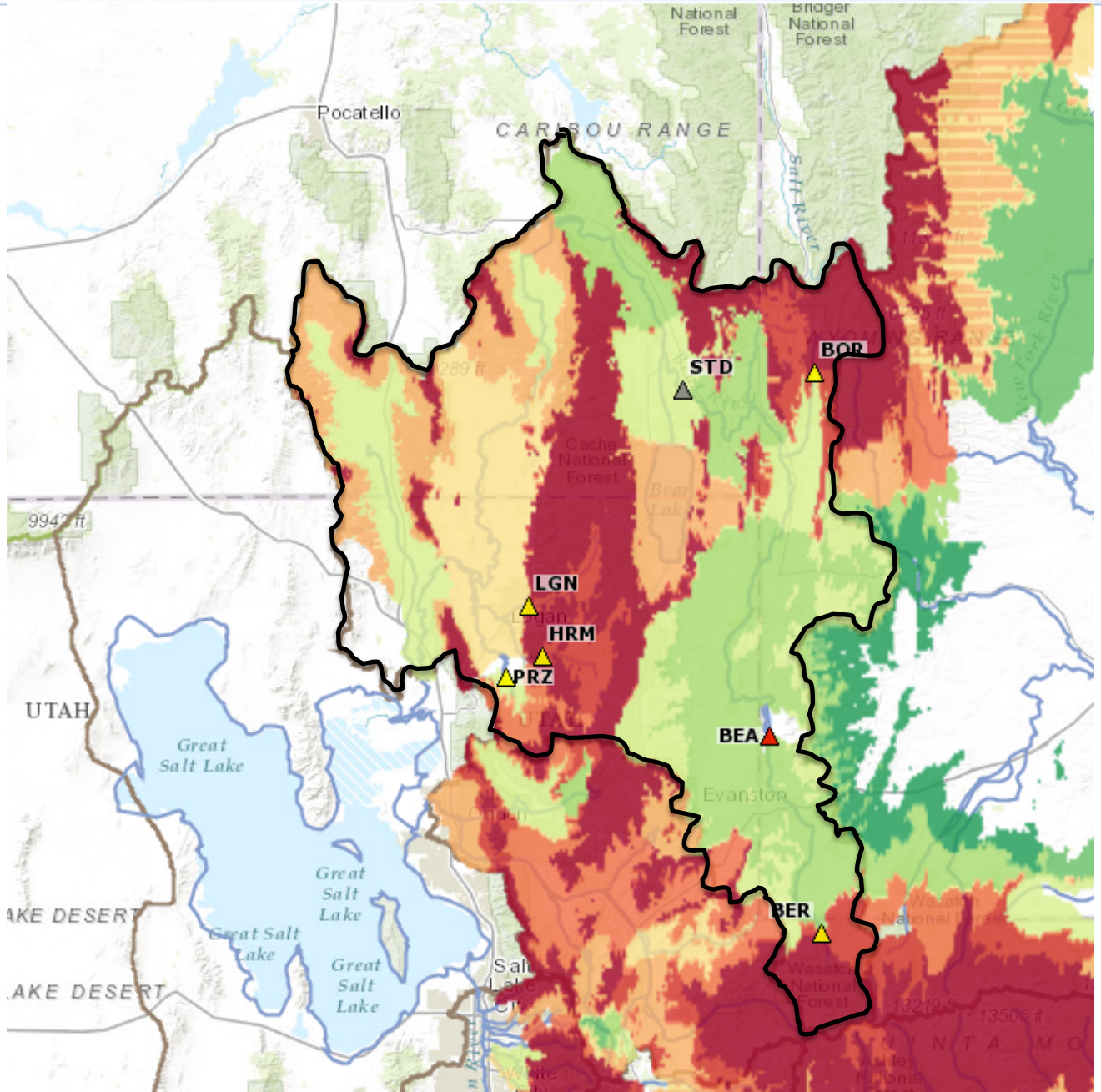
- 0-30%

Bear River Basin: CBRFC Soil Saturation – April 6th



Water supply forecast point

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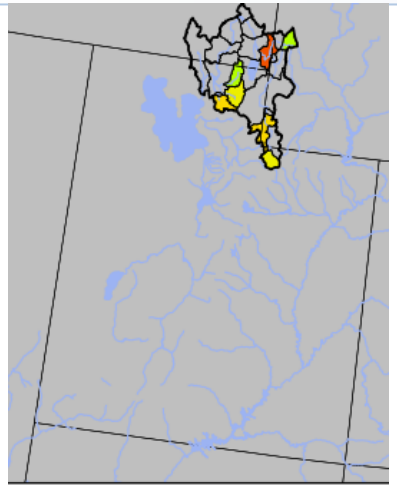
CBRFC Soil Moisture Model Inches to Saturation

Inches

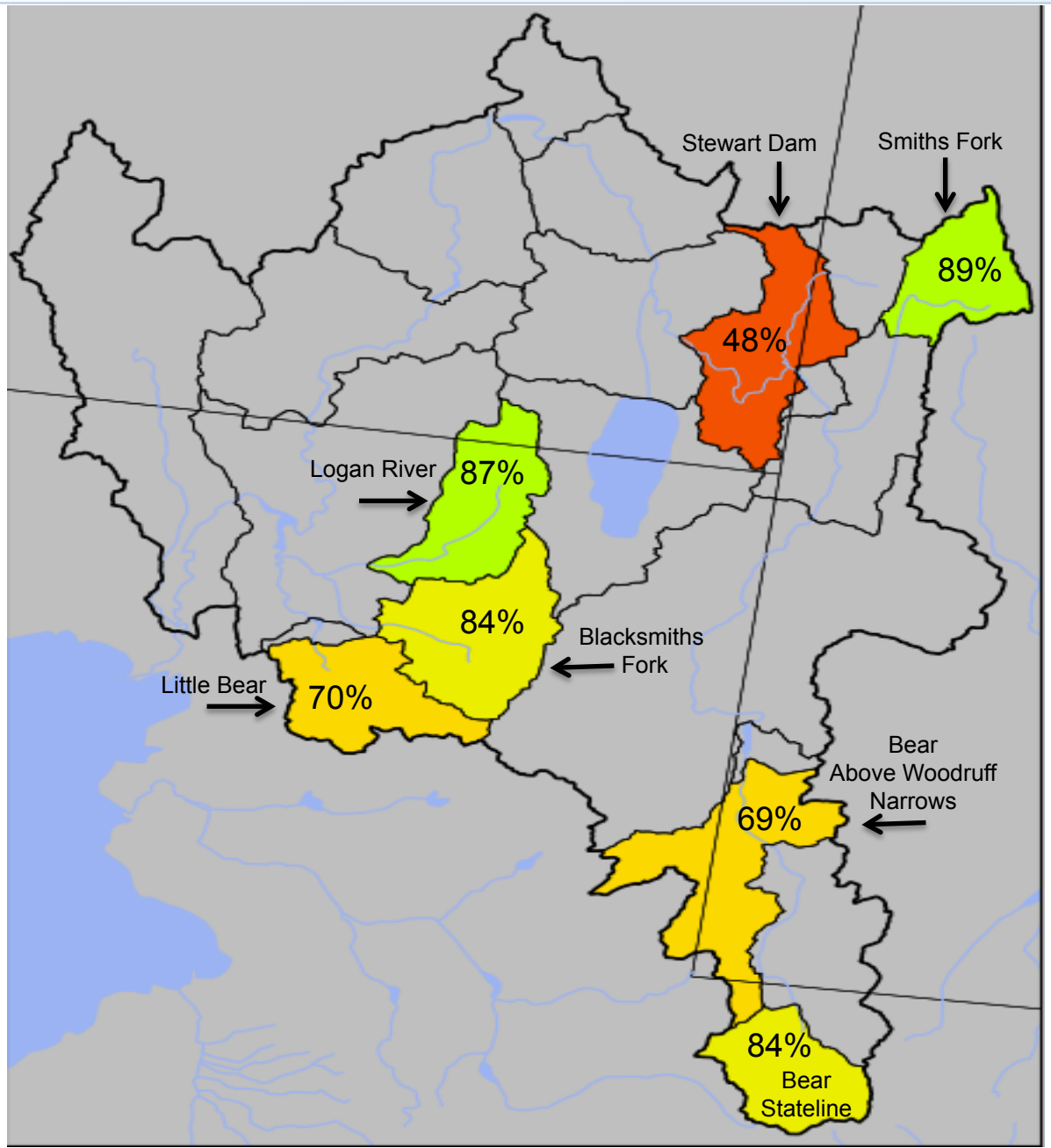
- >12
- 10-12
- 8-10
- 6-8
- 5-6
- 4-5
- 3-4
- 2-3
- 1-2
- <1

April 1st Water Supply Forecasts – Bear River Basin

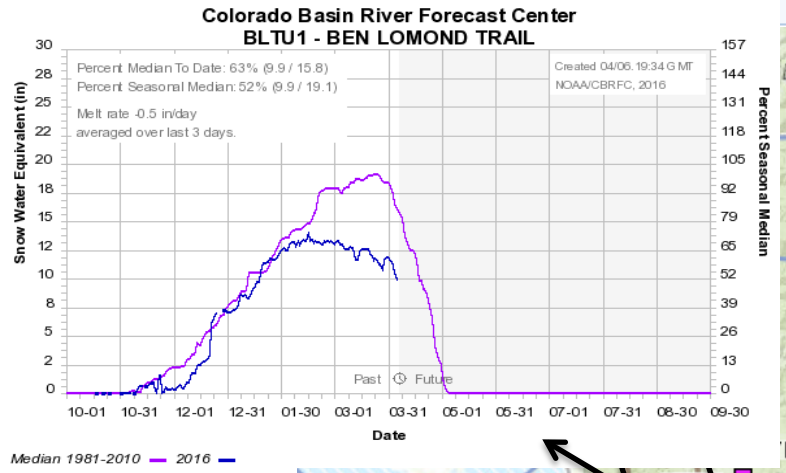


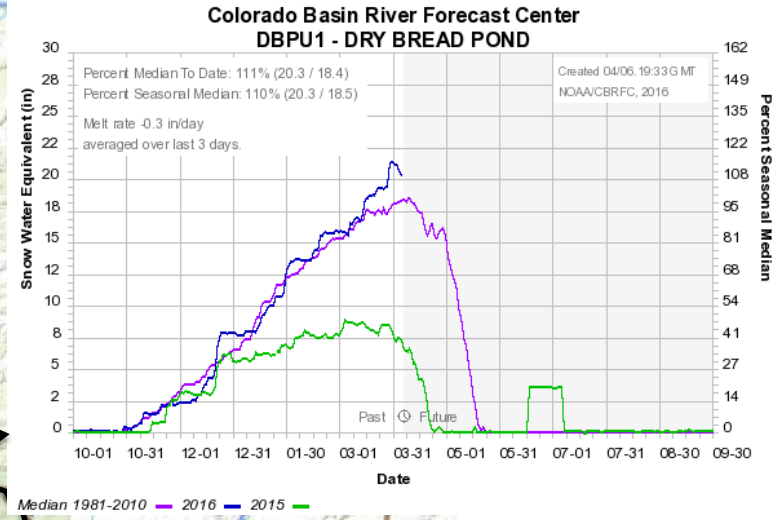
April-July
Forecast
Streamflow Volumes
(% of 1981-2010 average)

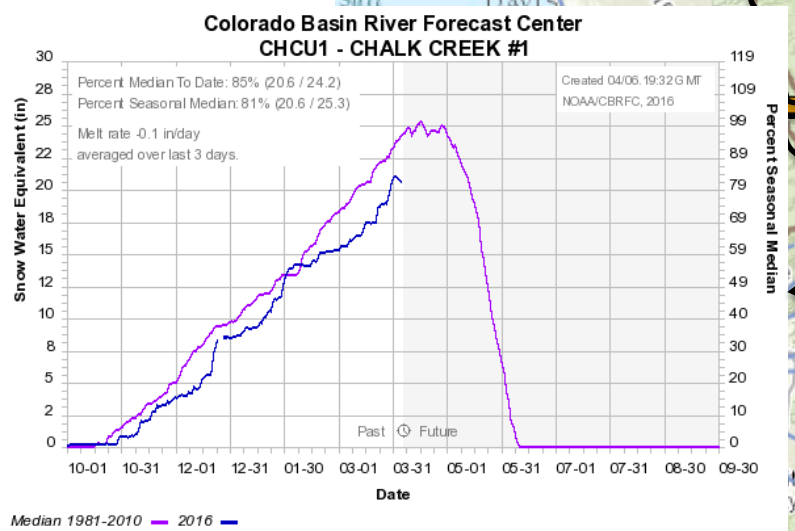
- Below 25%
- 25% - 35%
- 35% - 45%
- 45% - 55%
- 55% - 65%
- 65% - 75%
- 75% - 85%
- 85% - 95%
- 95% - 105%
- 105% - 115%
- 115% - 125%
- 125% - 135%
- 135% - 145%
- 145% - 155%
- 155% - 165%
- 165% - 175%
- Above 175%
- NA

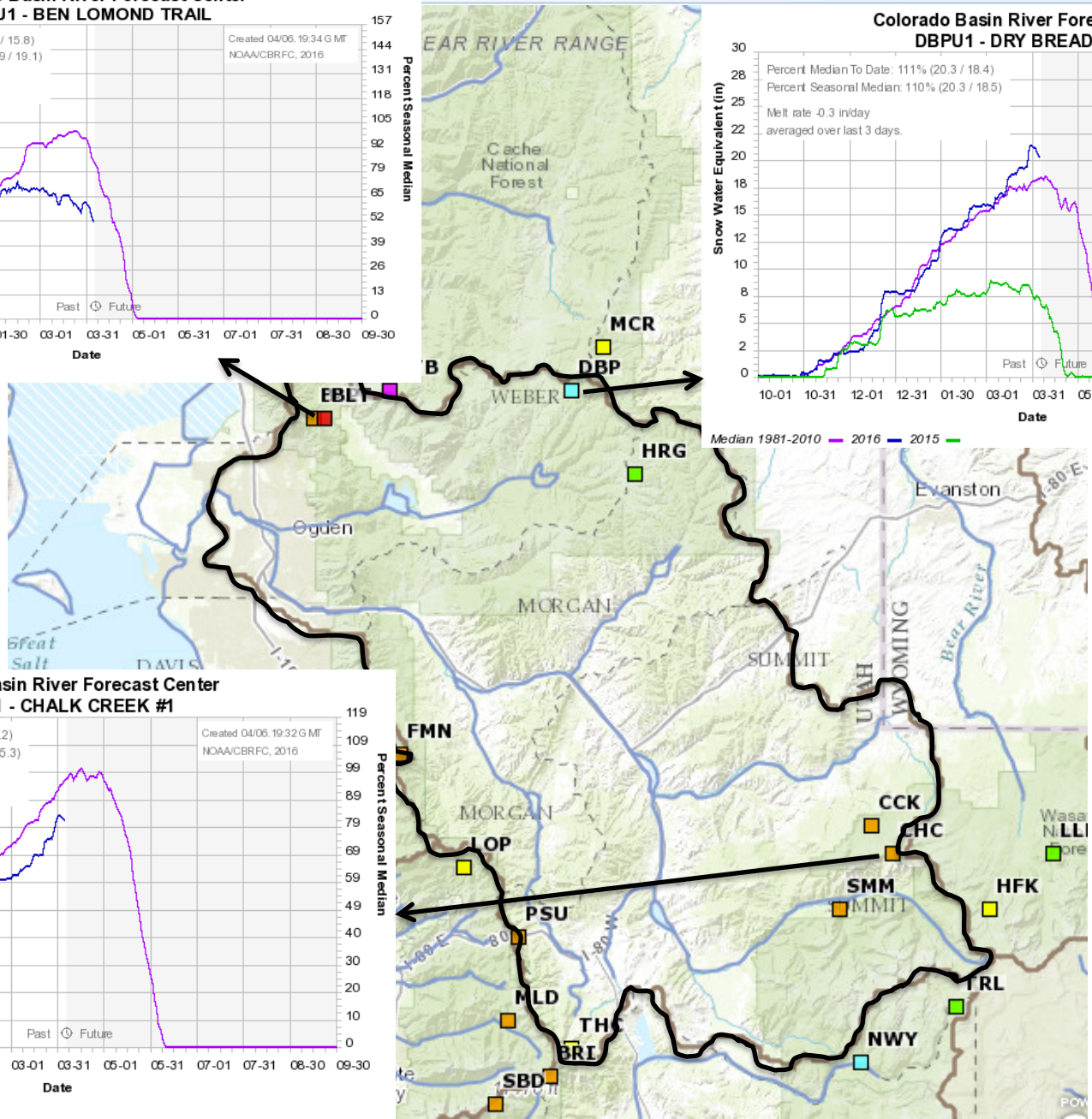


Weber River Basin: April 6th SNOTEL (percent of median)









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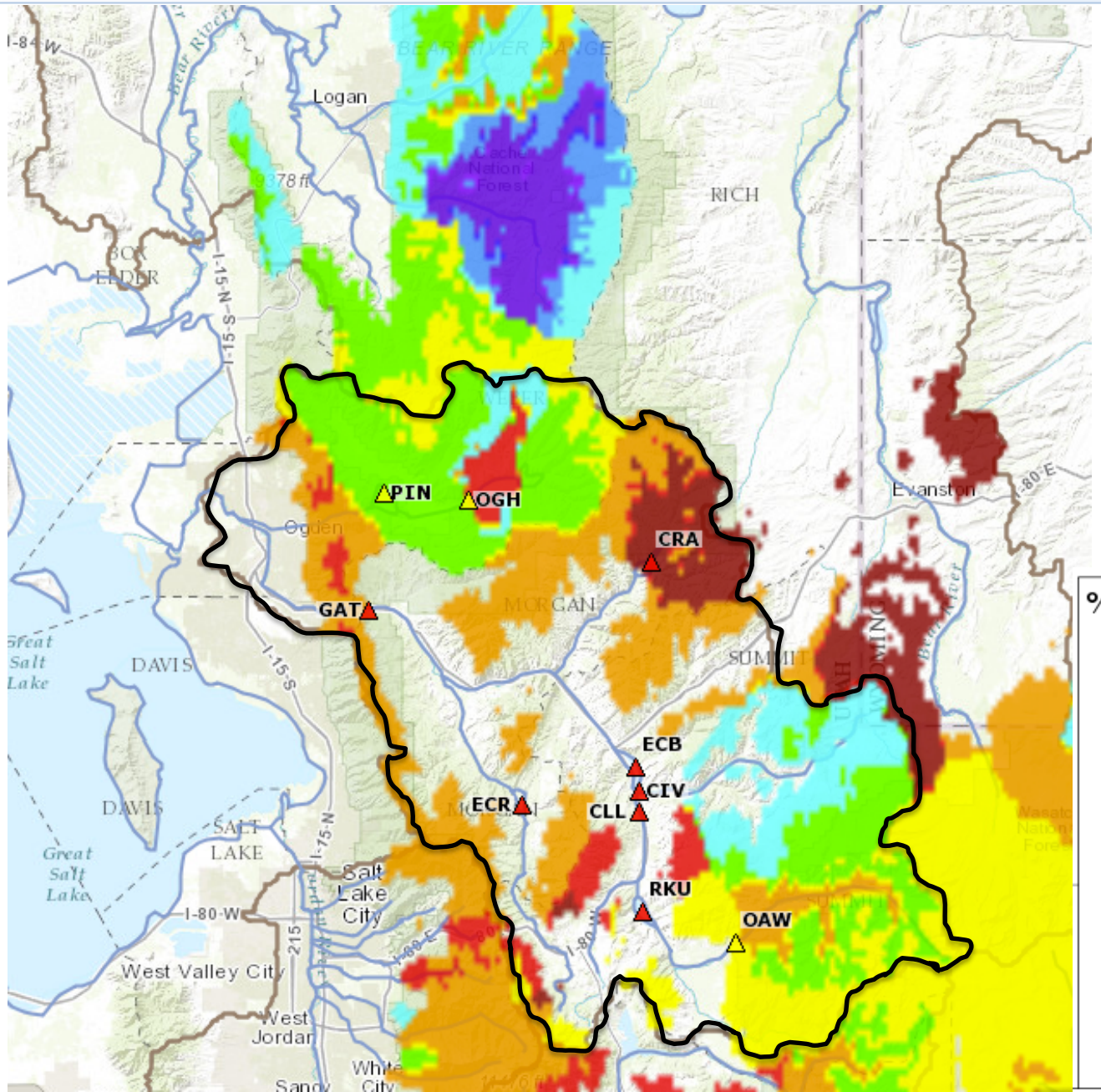
- 150-200%
- 200-300%
- 300-500
- >500%

Weber River Basin: CBRFC Model Snow – April 6th



Water supply forecast point

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- < 70%
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CBRFC Model Snow

% Median SWE

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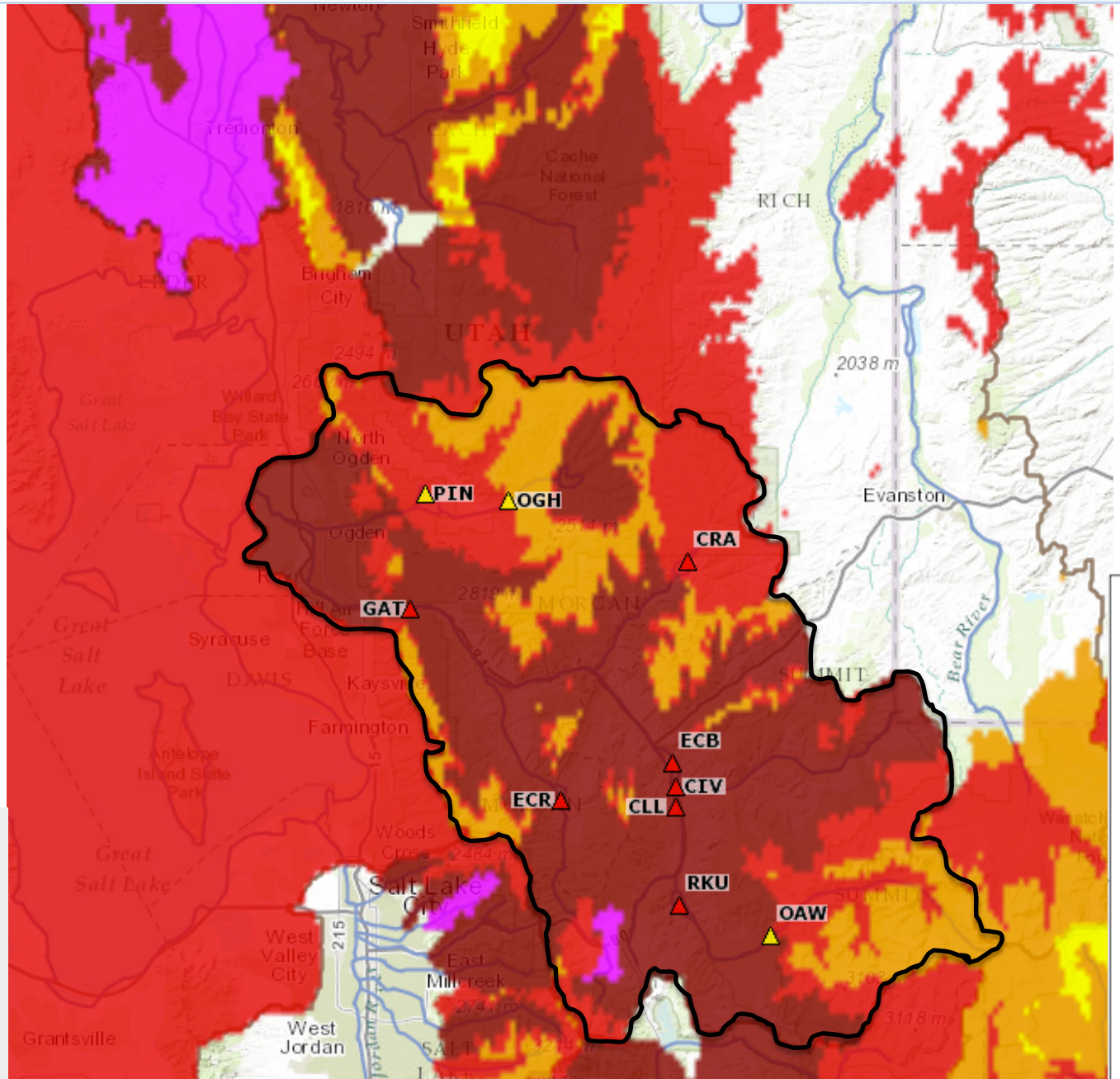
Weber River Basin: CBRFC Model soil moisture entering winter



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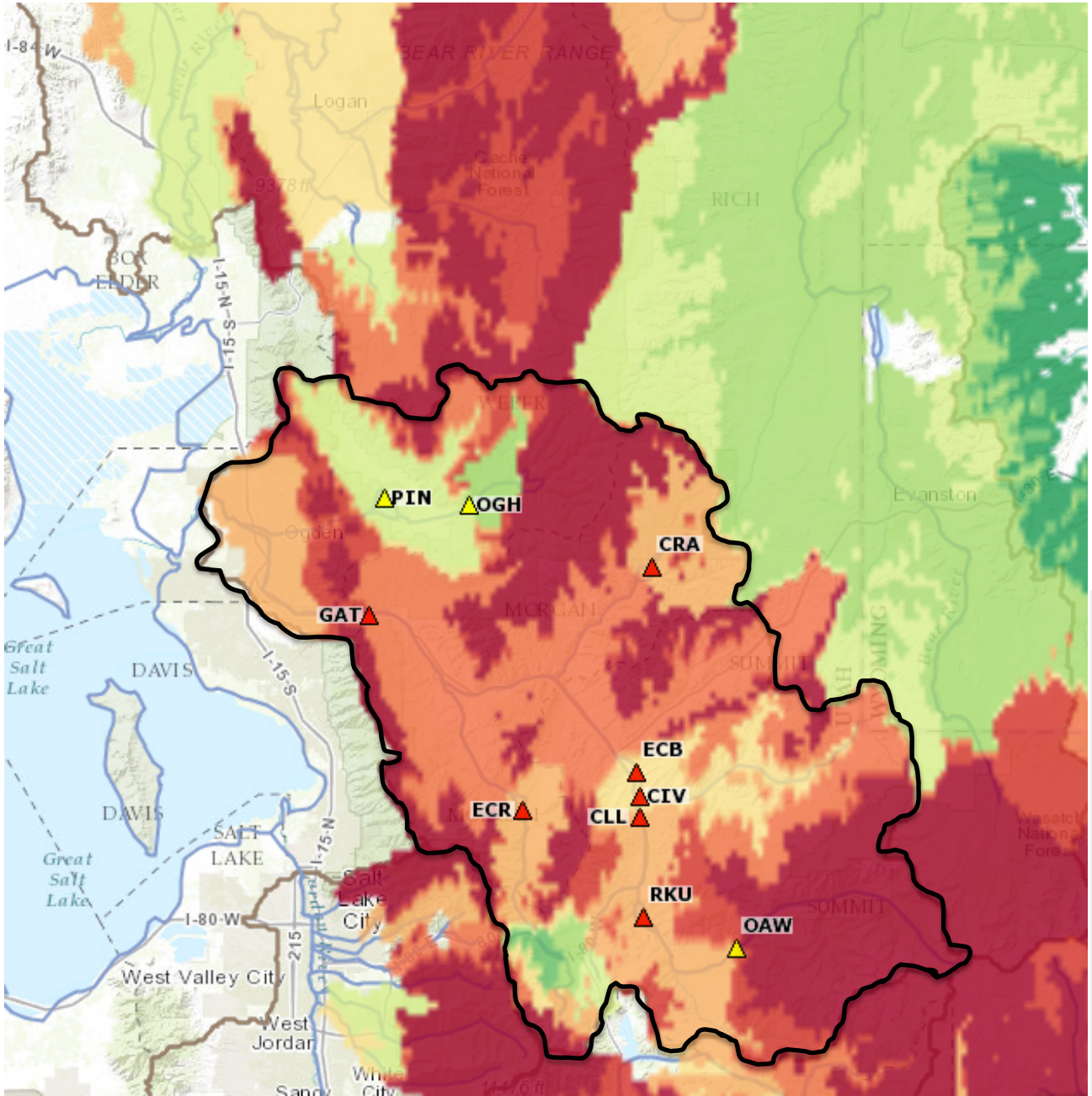
Weber River Basin: CBRFC Soil Saturation – April 6th



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CBRFC Soil Moisture Model Inches to Saturation

Inches

- >12
- 10-12
- 8-10
- 6-8
- 5-6
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- 2-3
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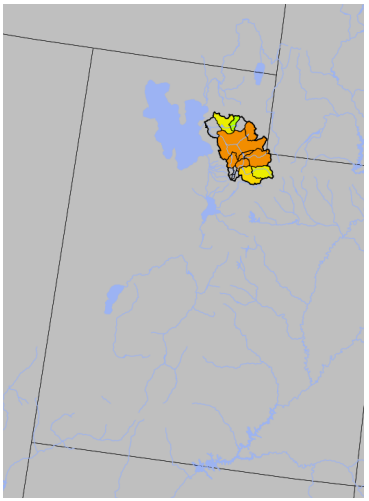
- <1

April 1st Water Supply Forecasts – Weber River Basin



April-July Forecast Streamflow Volumes (% of 1981-2010 average)

- Below 25%
- 25% - 35%
- 35% - 45%
- 45% - 55%
- 55% - 65%
- 65% - 75%
- 75% - 85%
- 85% - 95%
- 95% - 105%
- 105% - 115%
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- 125% - 135%
- 135% - 145%
- 145% - 155%
- 155% - 165%
- 165% - 175%
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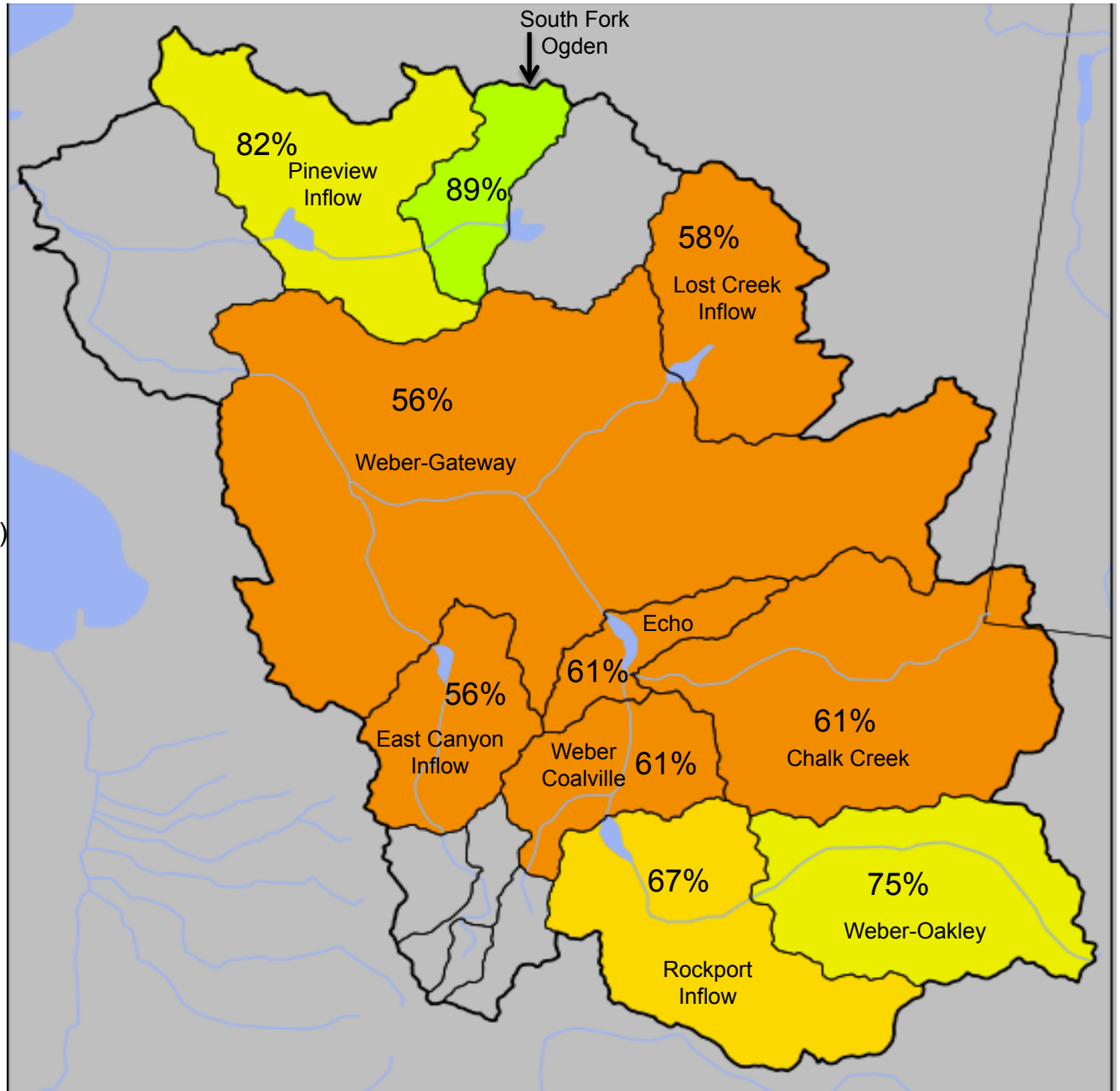
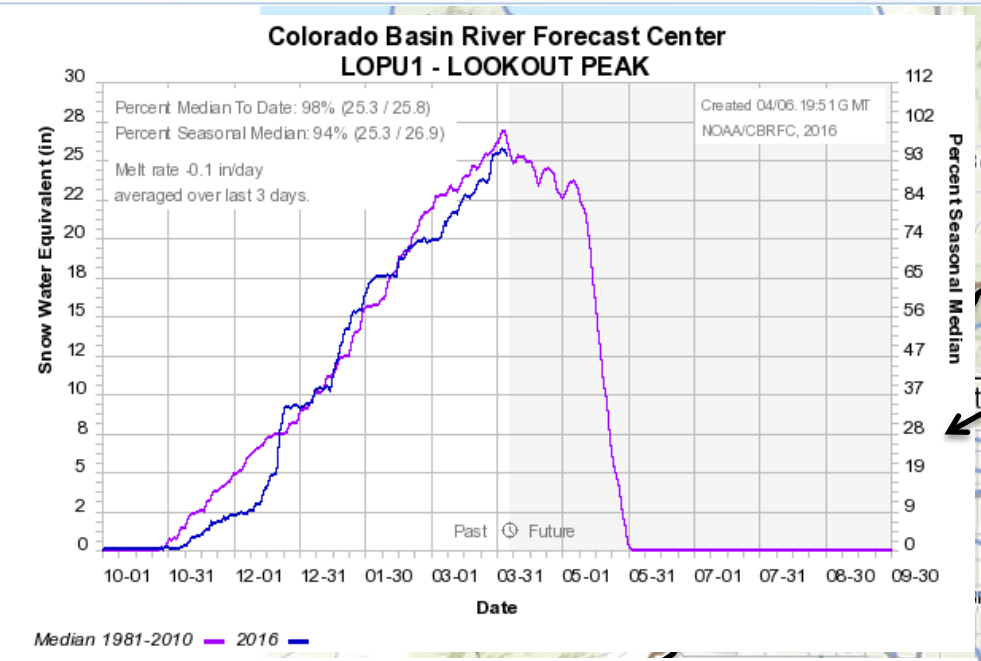
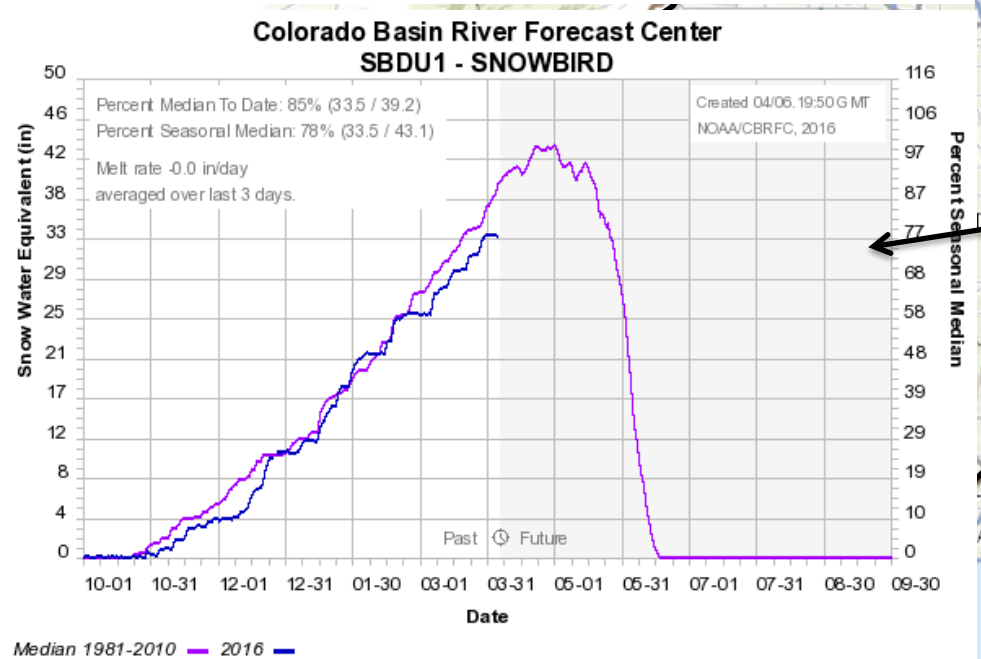
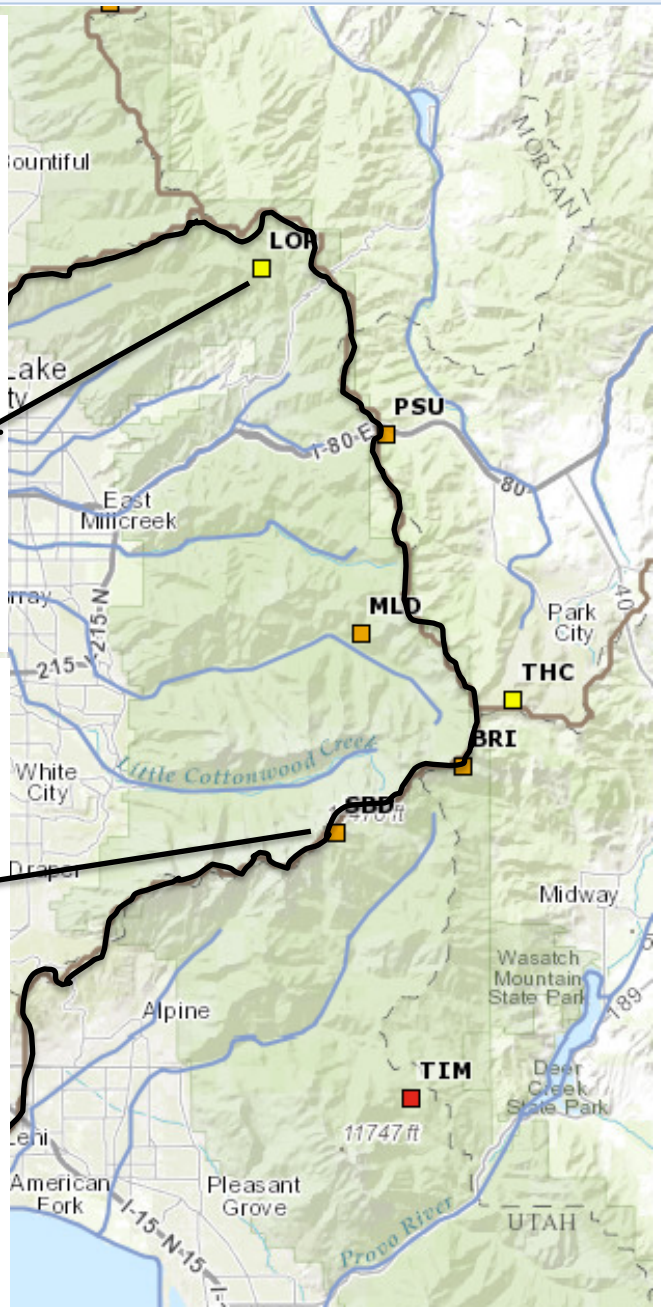
- NA



Six Creeks: April 6th SNOTEL (percent of median)







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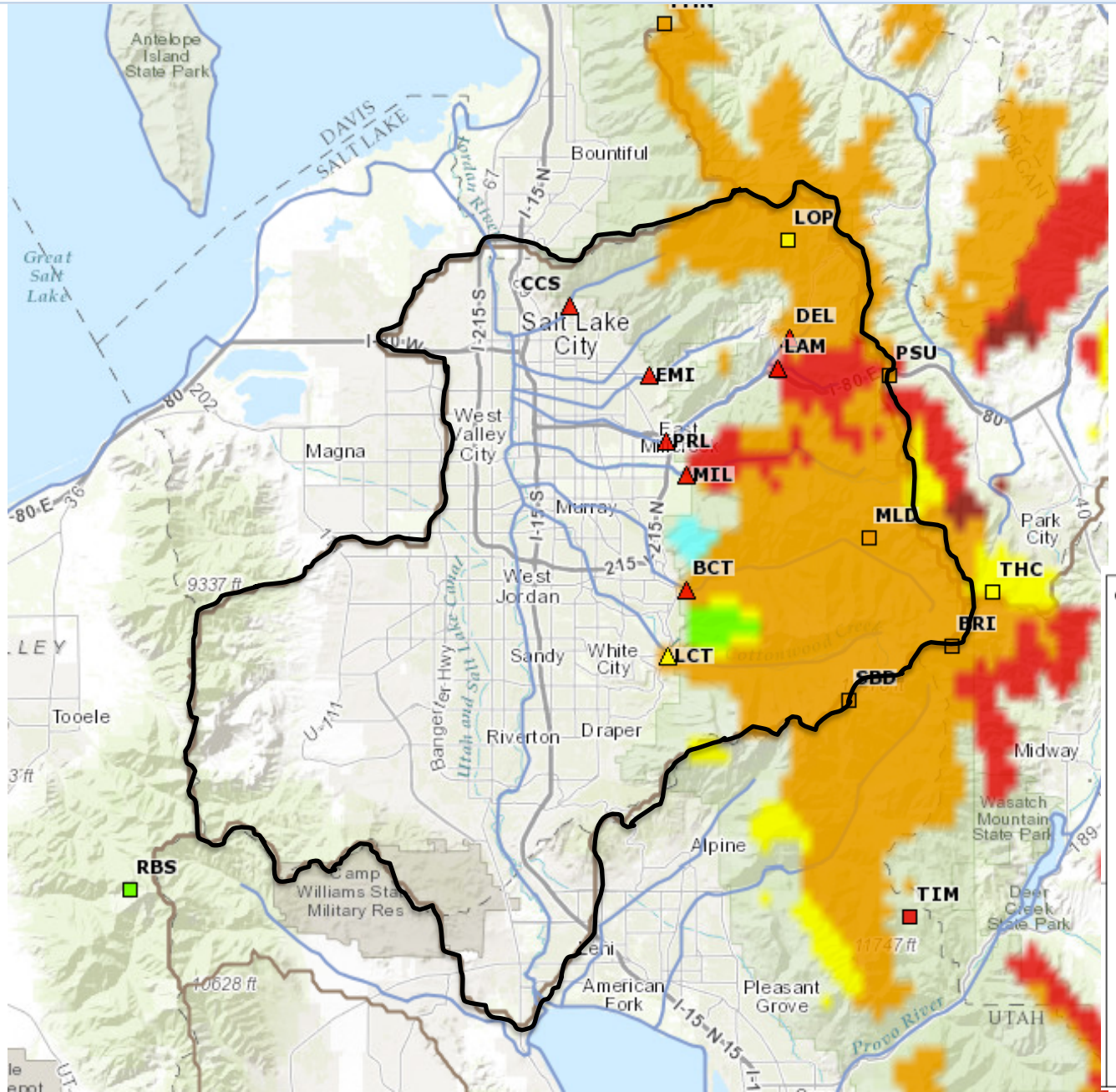
Six Creeks: CBRFC Model Snow – April 6th



Water supply forecast point

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CBRFC Model Snow

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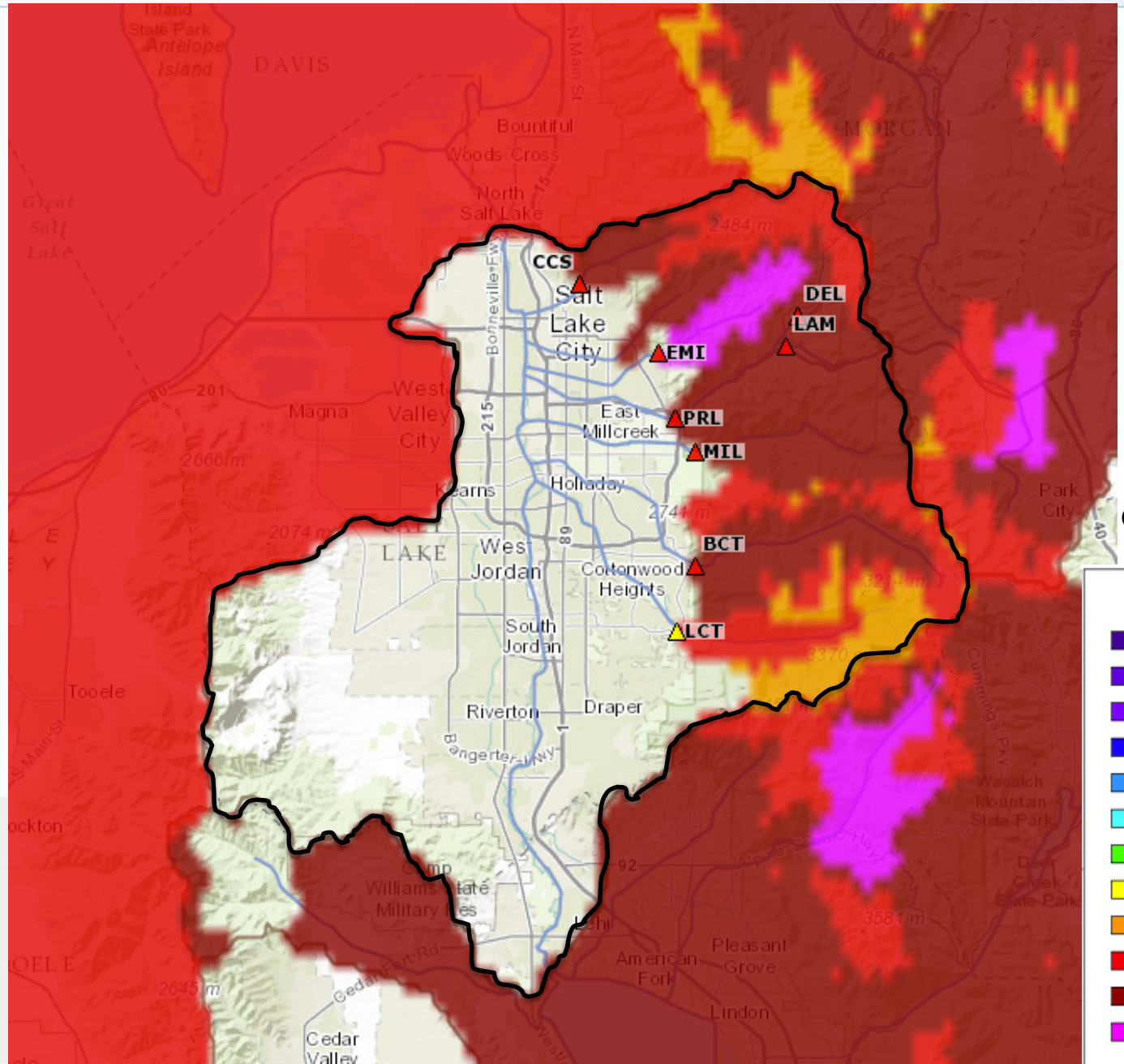
Six Creeks: CBRFC Model soil moisture entering winter



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CBRFC Model Soil Moisture

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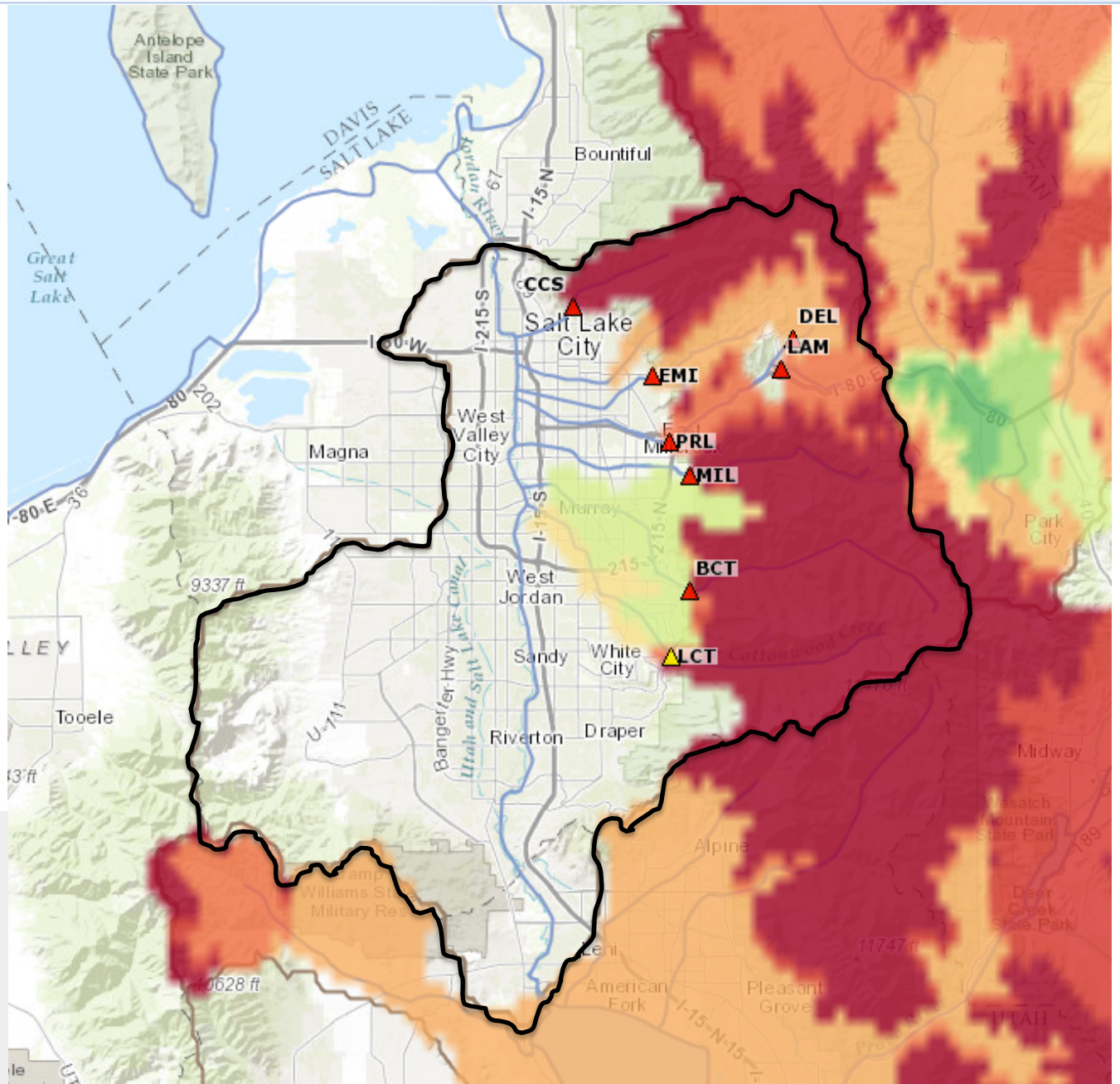
Six Creeks: CBRFC Soil Saturation – April 6th



Water supply forecast point

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CBRFC Soil Moisture Model Inches to Saturation

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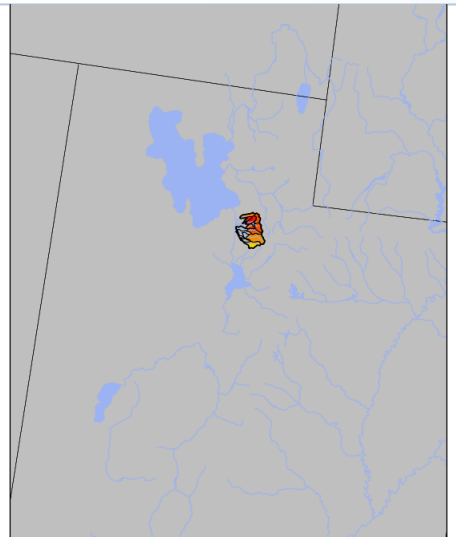
- 2-3
- 1-2
- <1

April 1st Water Supply Forecasts – Six Creeks



April-July
Forecast
Streamflow Volumes
(% of 1981-2010 average)

- Below 25%
- 25% - 35%
- 35% - 45%
- 45% - 55%
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- 105% - 115%
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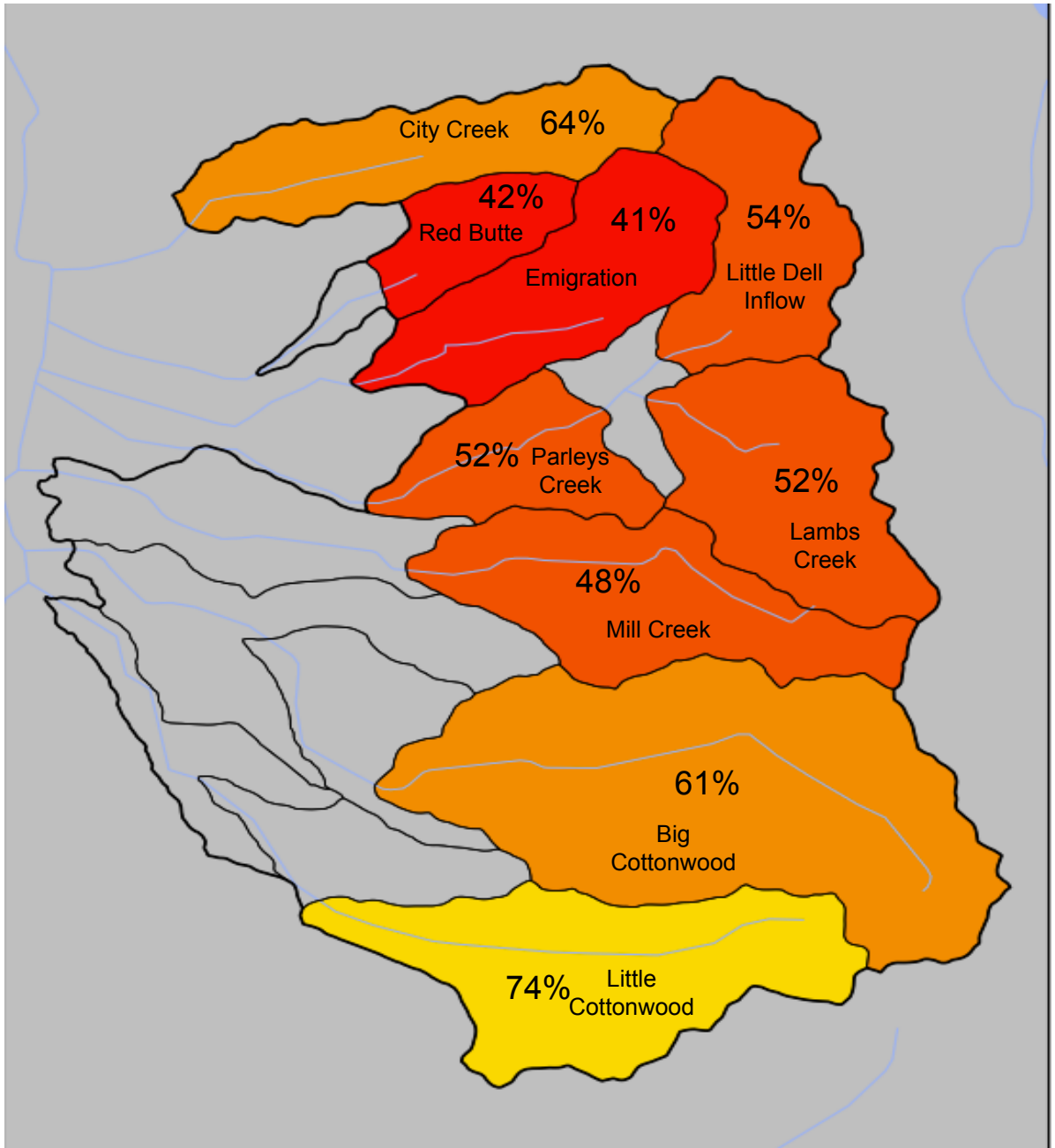
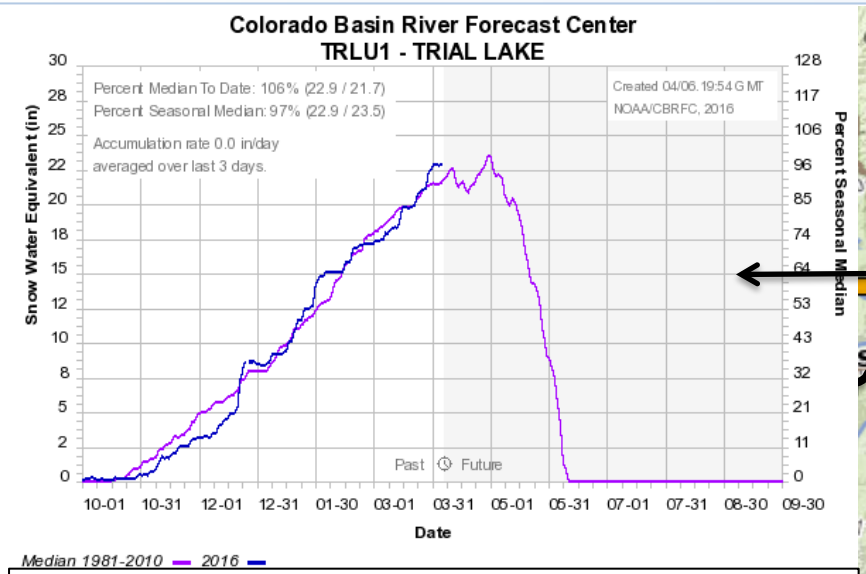
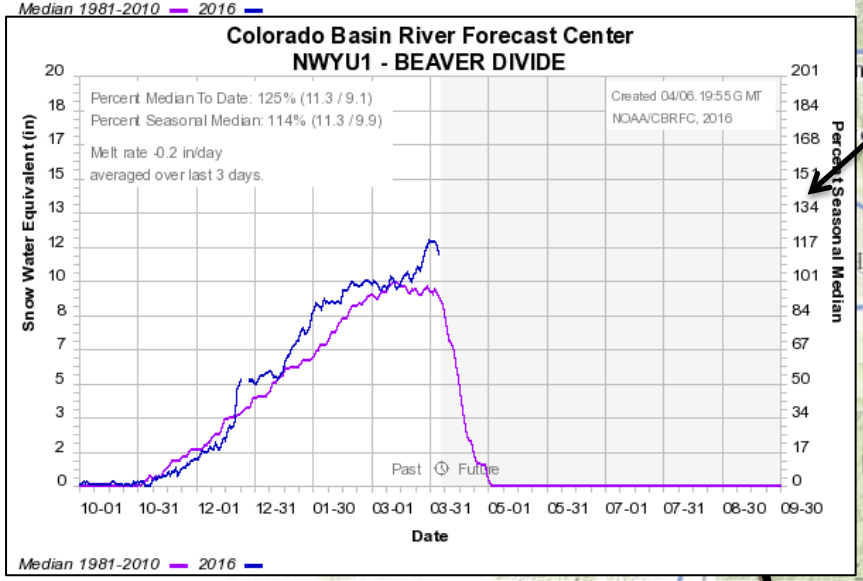
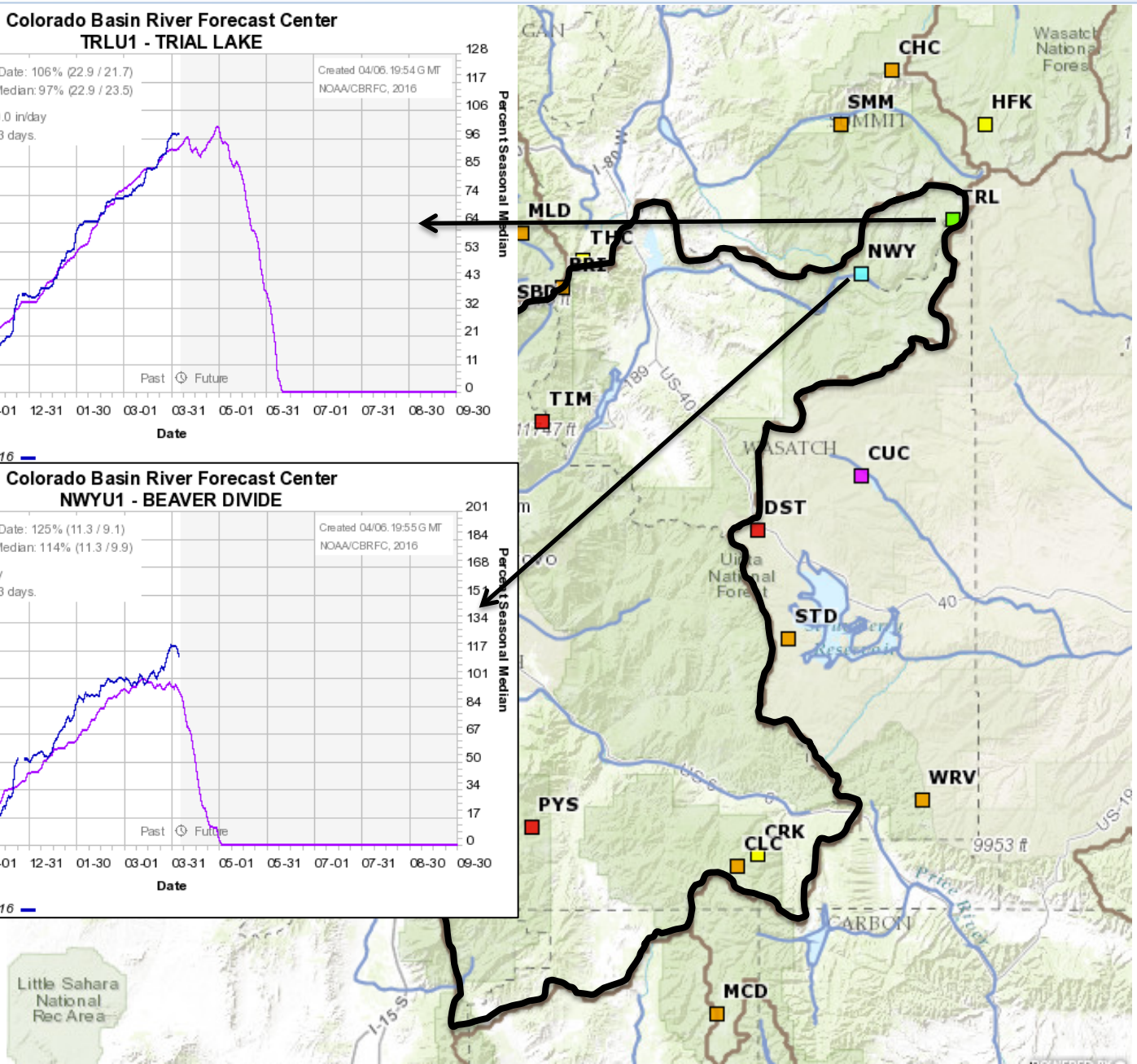
- 125% - 135%
- 135% - 145%
- 145% - 155%
- 155% - 165%
- 165% - 175%
- Above 175%
- NA



Provo River / UT Lake: April 6th SNOTEL (percent of median)



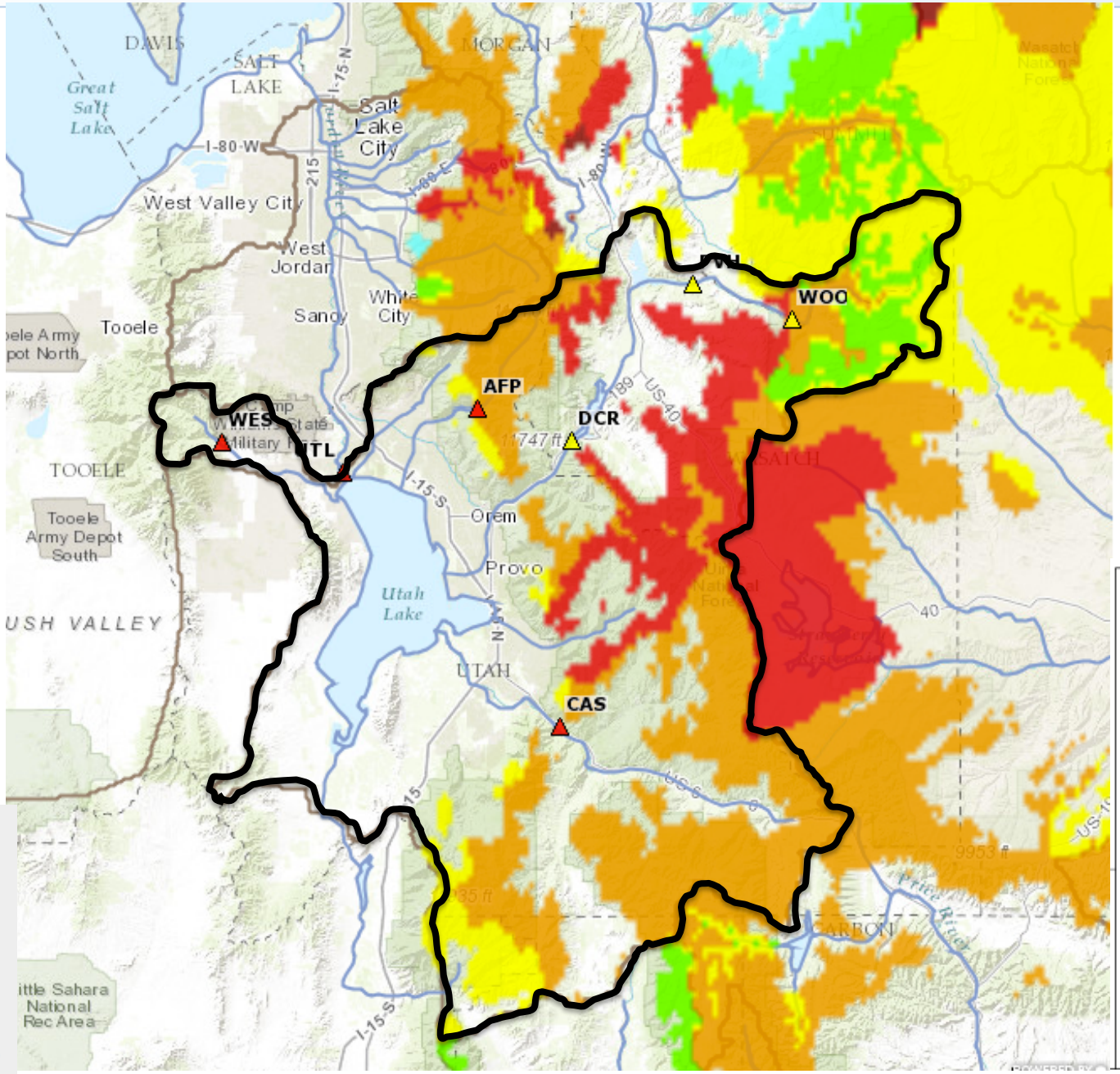




SNOTEL
Percent of Median

- No Data
- < 30%
- 30-50%
- 50-70%
- 70-90%
- 90-100%
- 100-110%
- 110-130%
- 130-150%
- 150-200%
- 200-300%
- 300-500
- >500%

Provo River / UT Lake: CBRFC Model Snow – April 6th



Water supply forecast point

(% average Forecast)

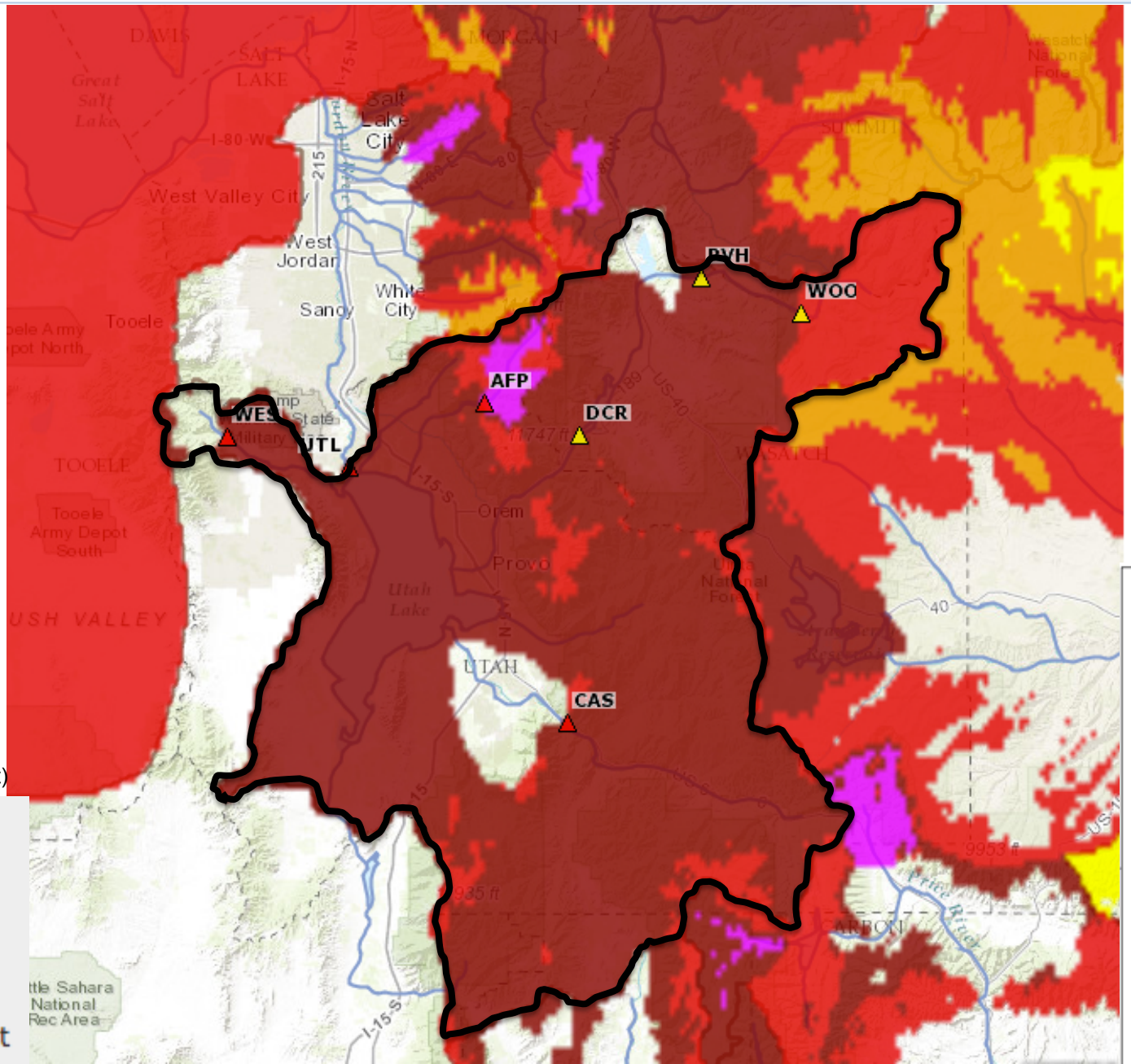
- < 70%
- 70-90%
- 90-110%
- 110-130%
- >130%
- Regulated
- No Forecast

CBRFC Model Snow

% Median SWE

- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%

Provo River / UT Lake: CBRFC Model soil moisture entering winter



Water supply forecast point

(% average Forecast)

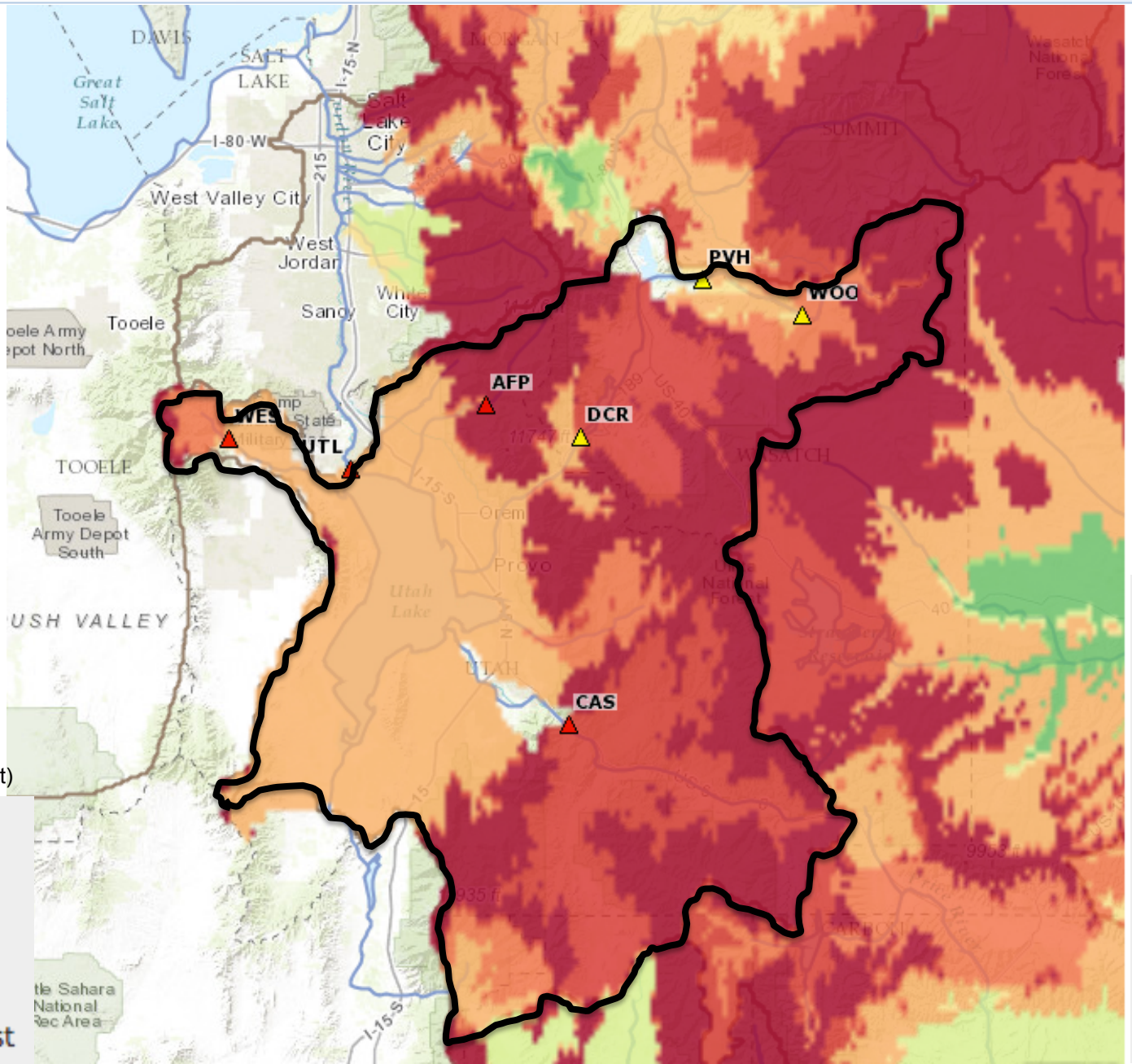
- < 70%
- 70-90%
- 90-110%
- 110-130%
- >130%
- Regulated
- No Forecast

CBRFC Model Soil Moisture

% Normal

- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%

Provo River / UT Lake: CBRFC Soil Saturation – April 6th



Water supply forecast point

(% average Forecast)

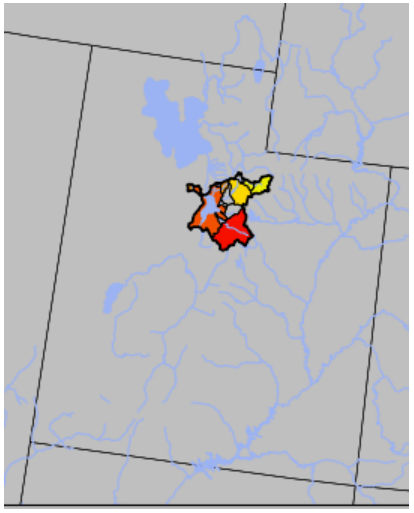
- < 70%
- 70-90%
- 90-110%
- 110-130%
- >130%
- Regulated
- No Forecast

CBRFC Soil Moisture Model Inches to Saturation

Inches

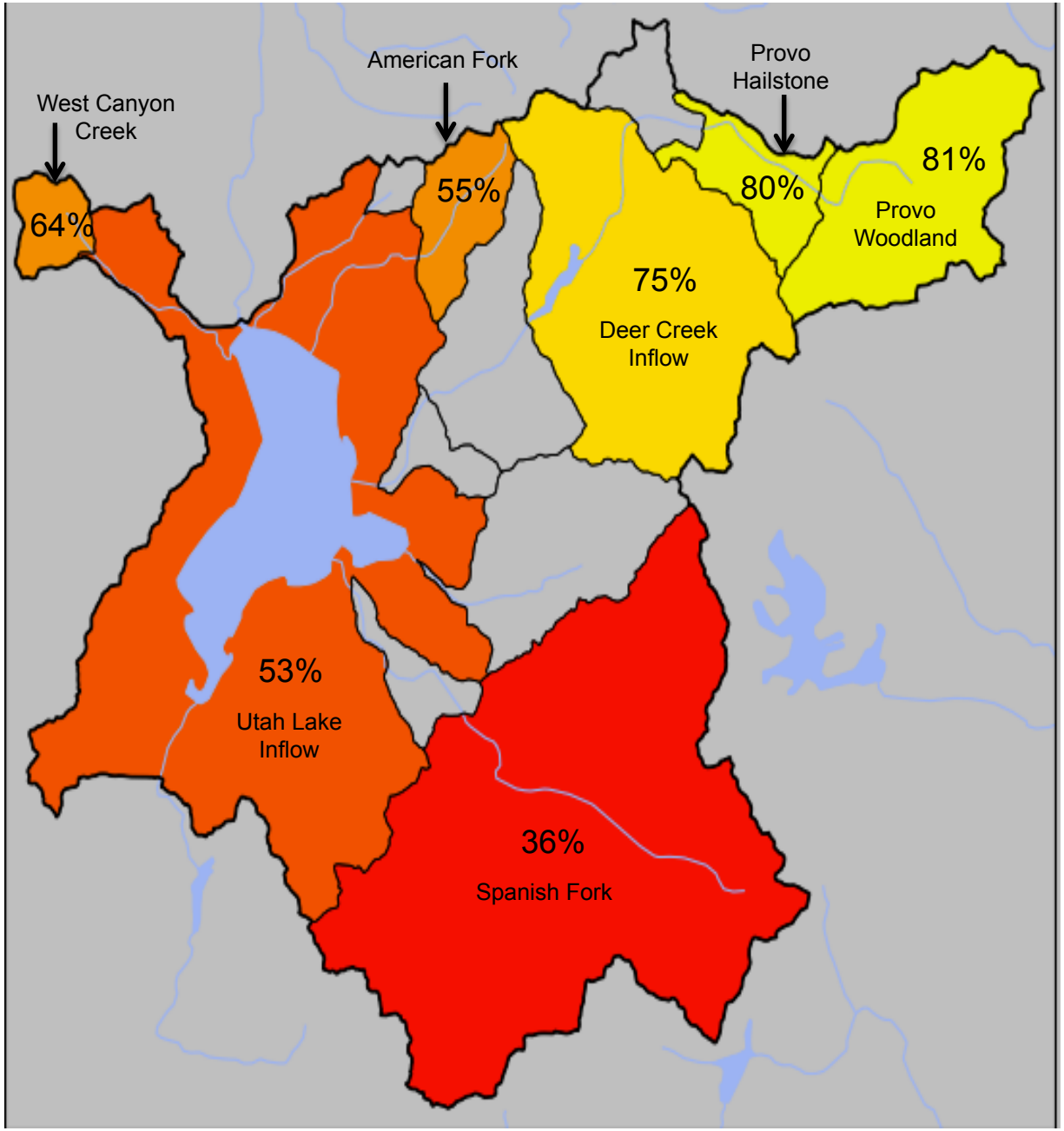
- >12
- 10-12
- 8-10
- 6-8
- 5-6
- 4-5
- 3-4
- 2-3
- 1-2
- <1

April 1st Water Supply Forecasts – Provo River / Utah Lake

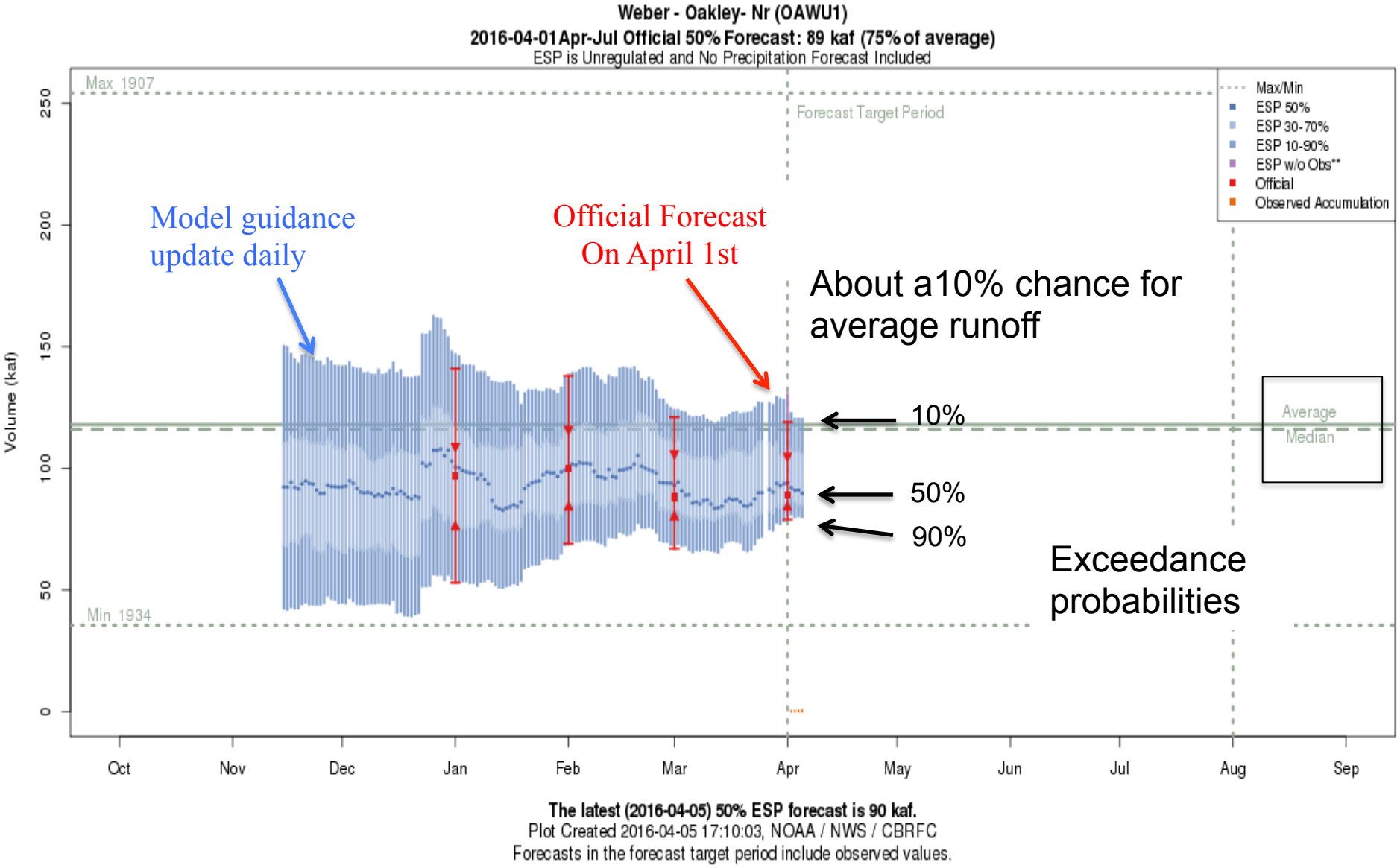


April-July
Forecast
Streamflow Volumes
(% of 1981-2010 average)

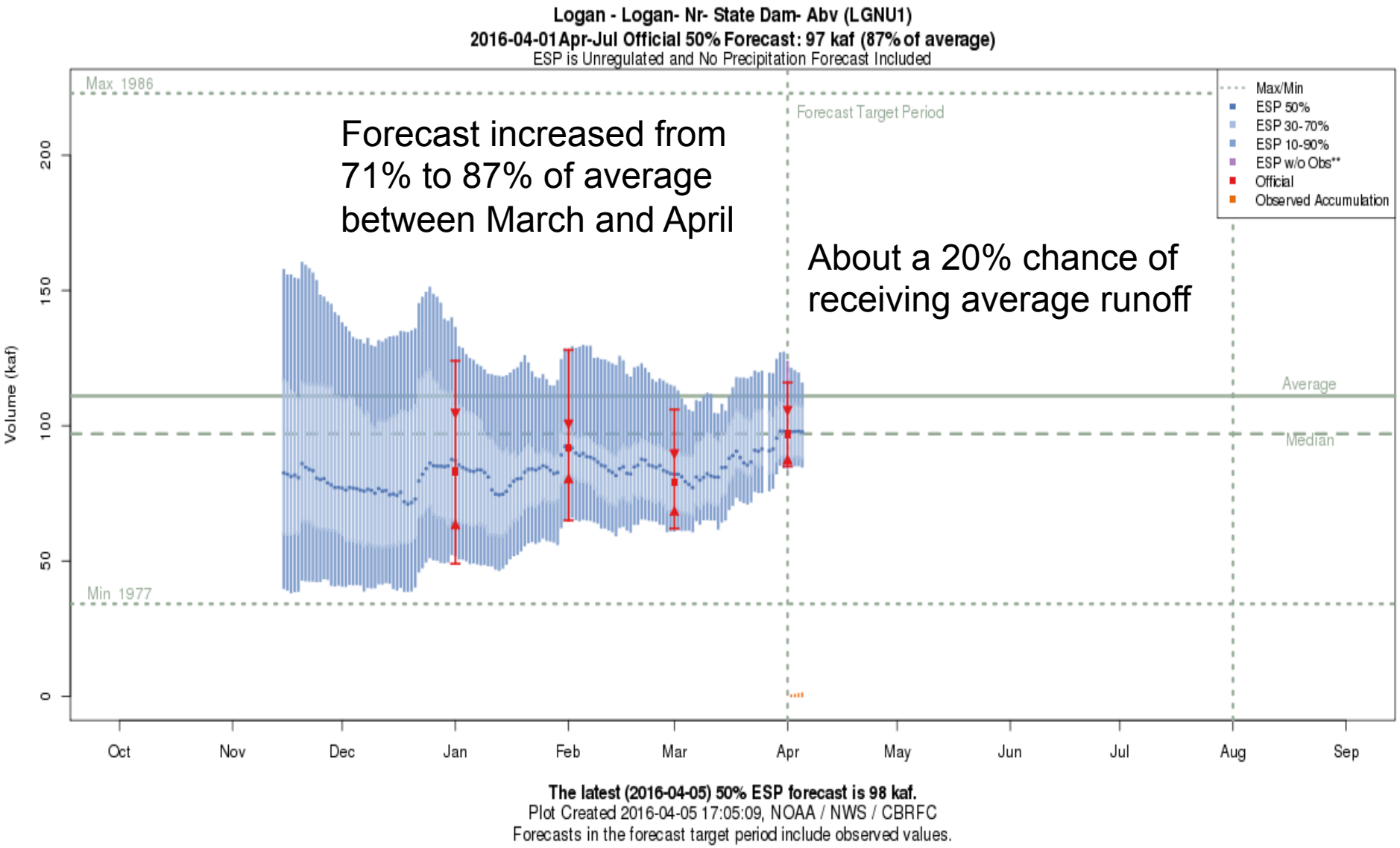
- Below 25%
- 25% - 35%
- 35% - 45%
- 45% - 55%
- 55% - 65%
- 65% - 75%
- 75% - 85%
- 85% - 95%
- 95% - 105%
- 105% - 115%
- 115% - 125%
- 125% - 135%
- 135% - 145%
- 145% - 155%
- 155% - 165%
- 165% - 175%
- Above 175%
- NA



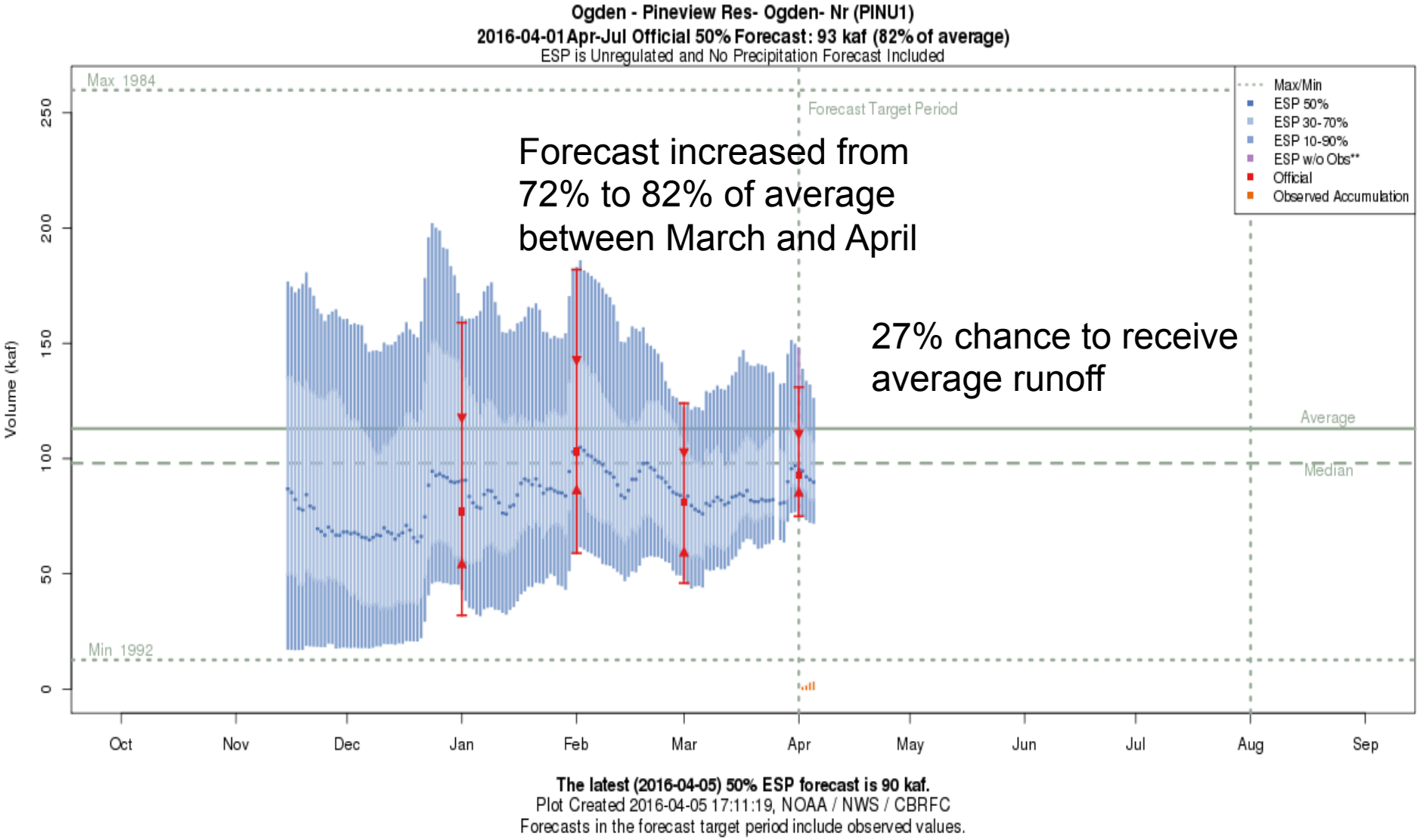
Weber River near Oakley forecast evolution plot



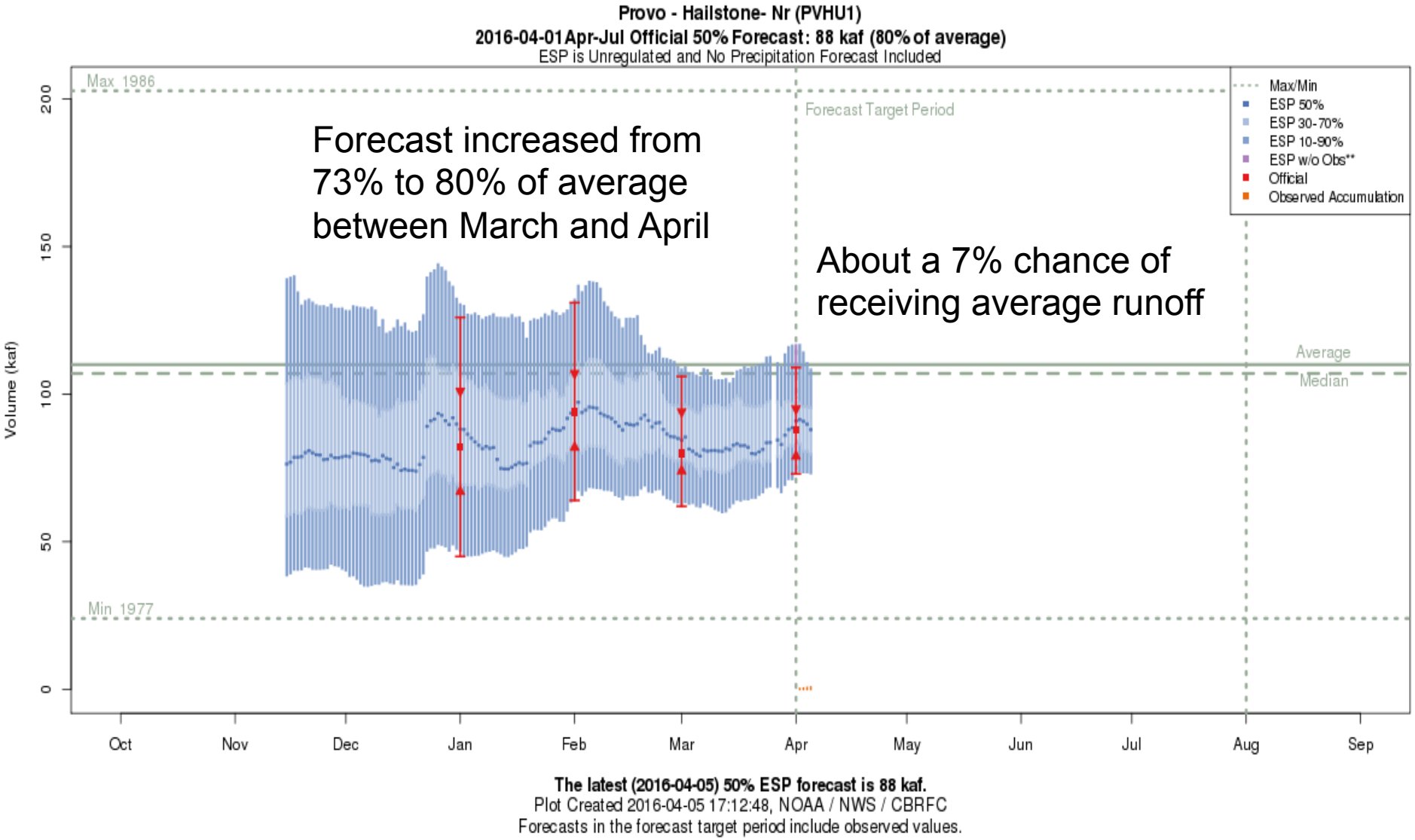
Logan River near Logan forecast evolution plot



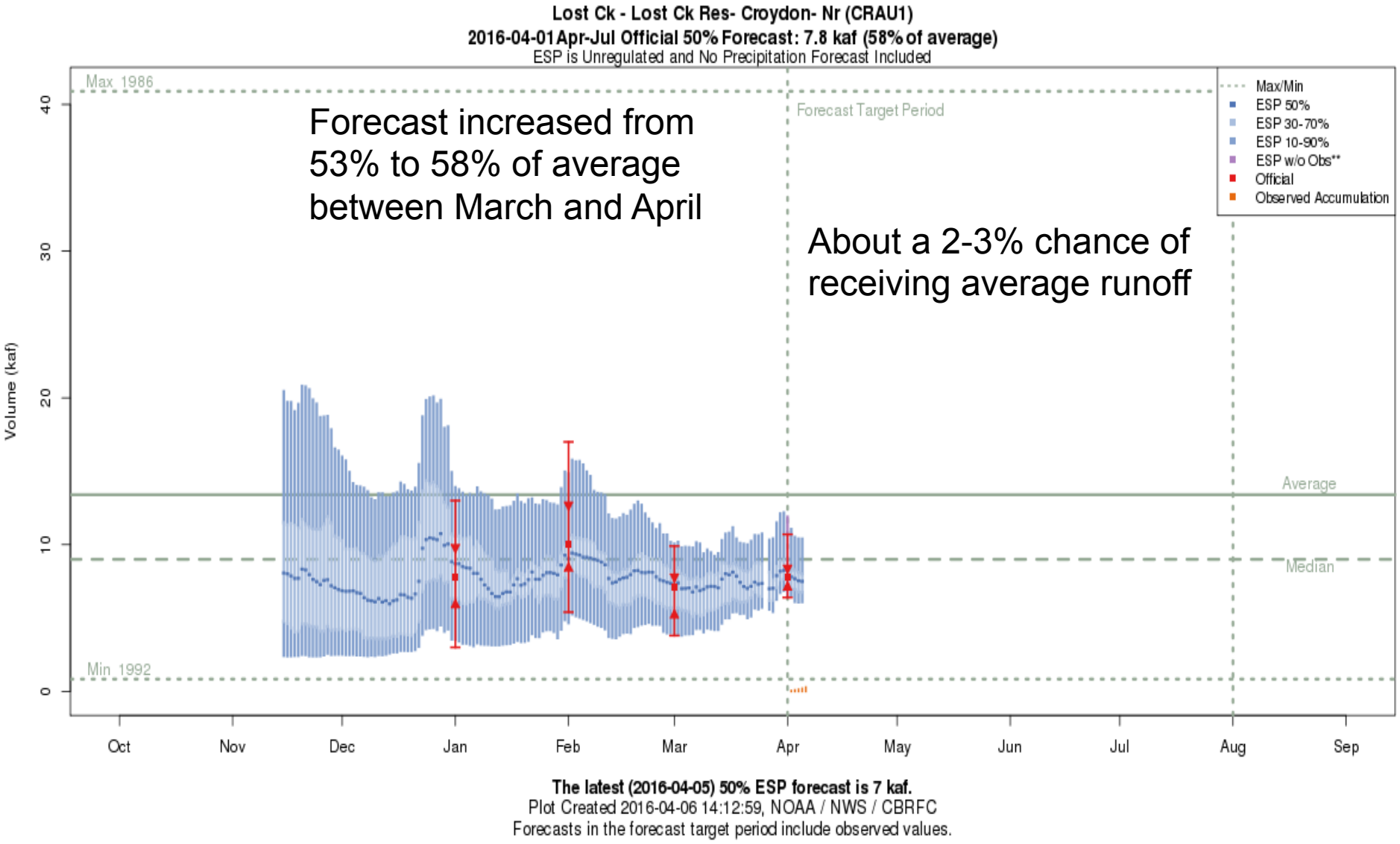
Pineview Reservoir inflow forecast evolution plot



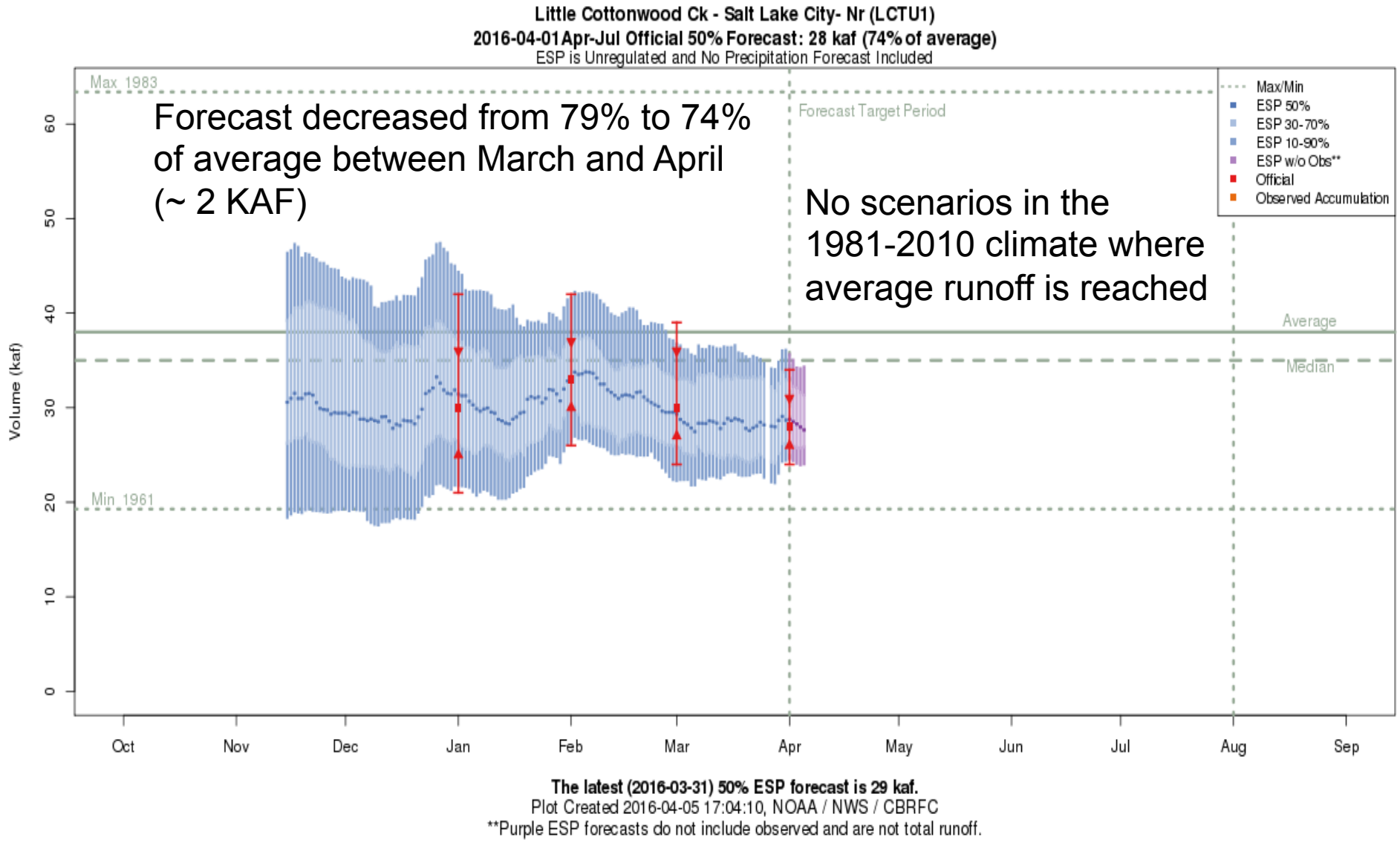
Provo River – Hailstone forecast evolution plot



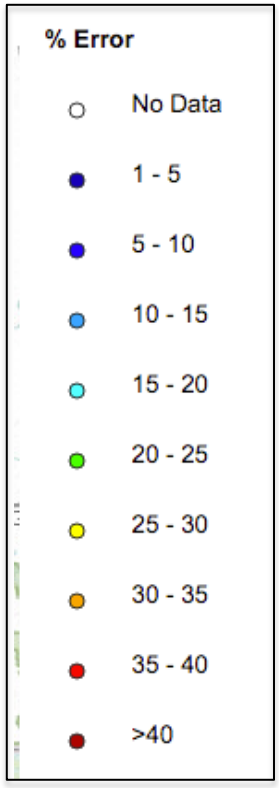
Lost Creek Inflow forecast evolution plot

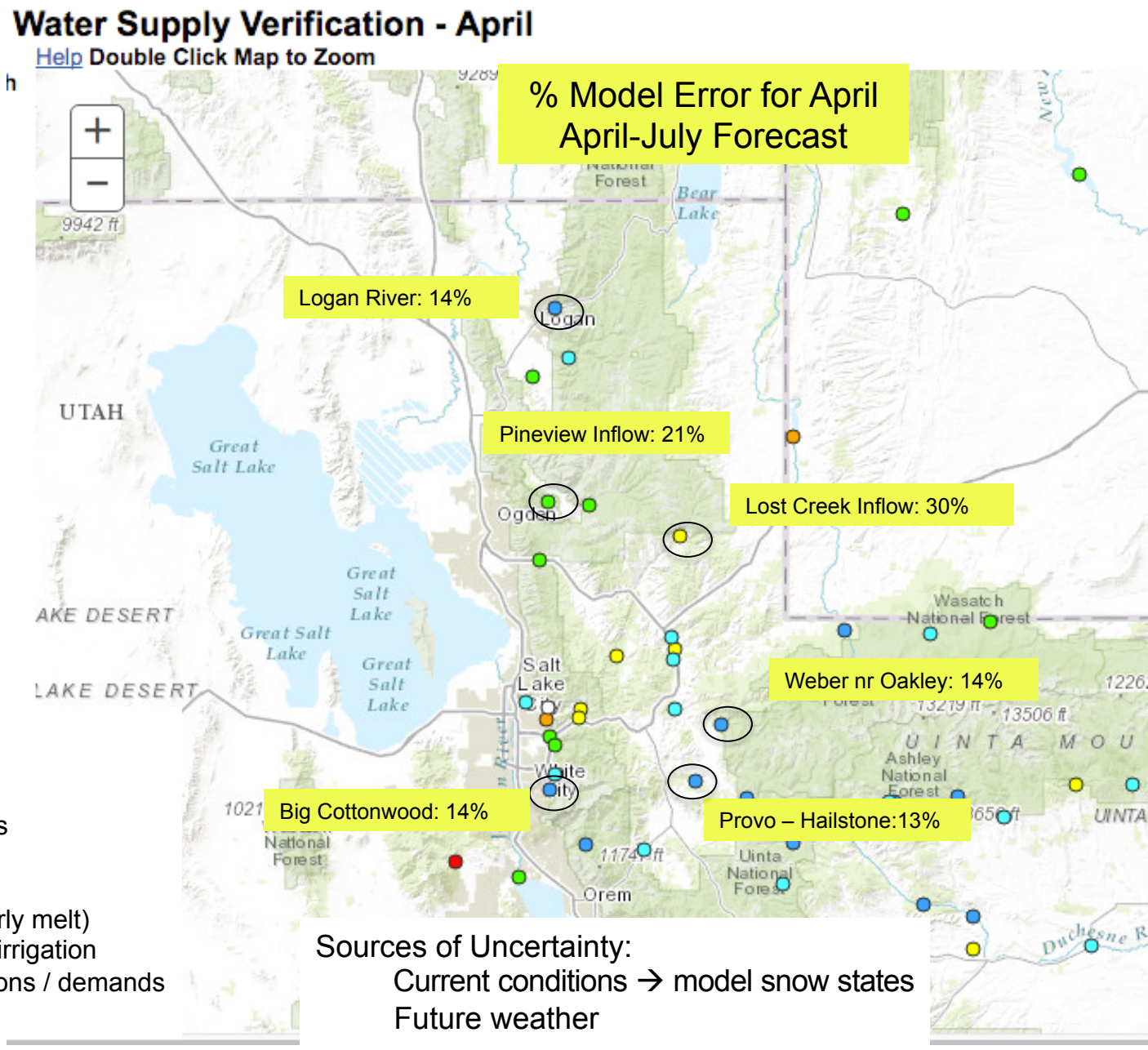


Little Cottonwood Creek forecast evolution plot



Forecast Accuracy ? How good are we in April ?



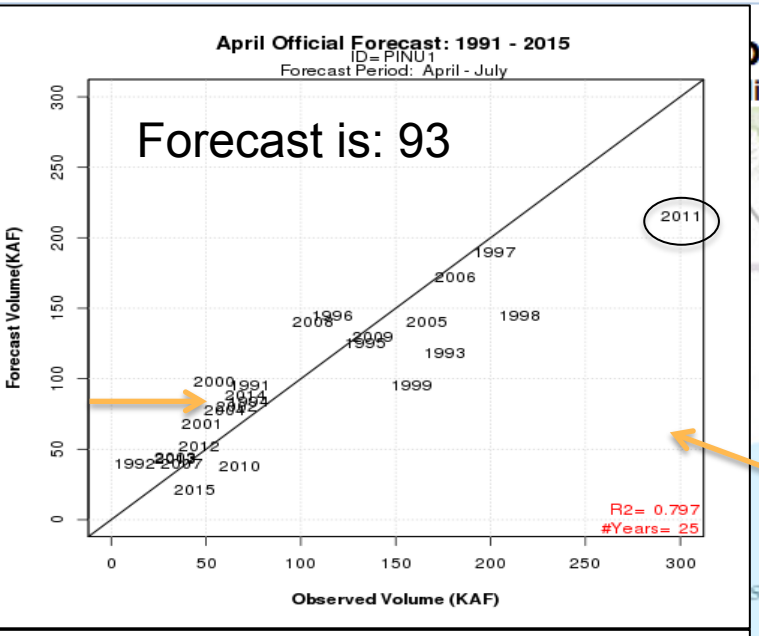


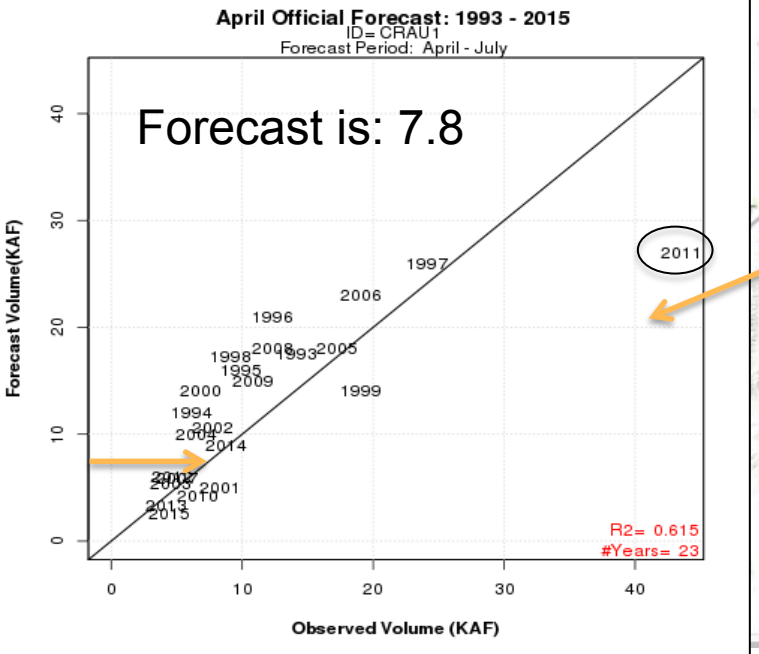
We Do Better:
- Headwaters
- Primarily snow melt basins
- Known diversions / demands

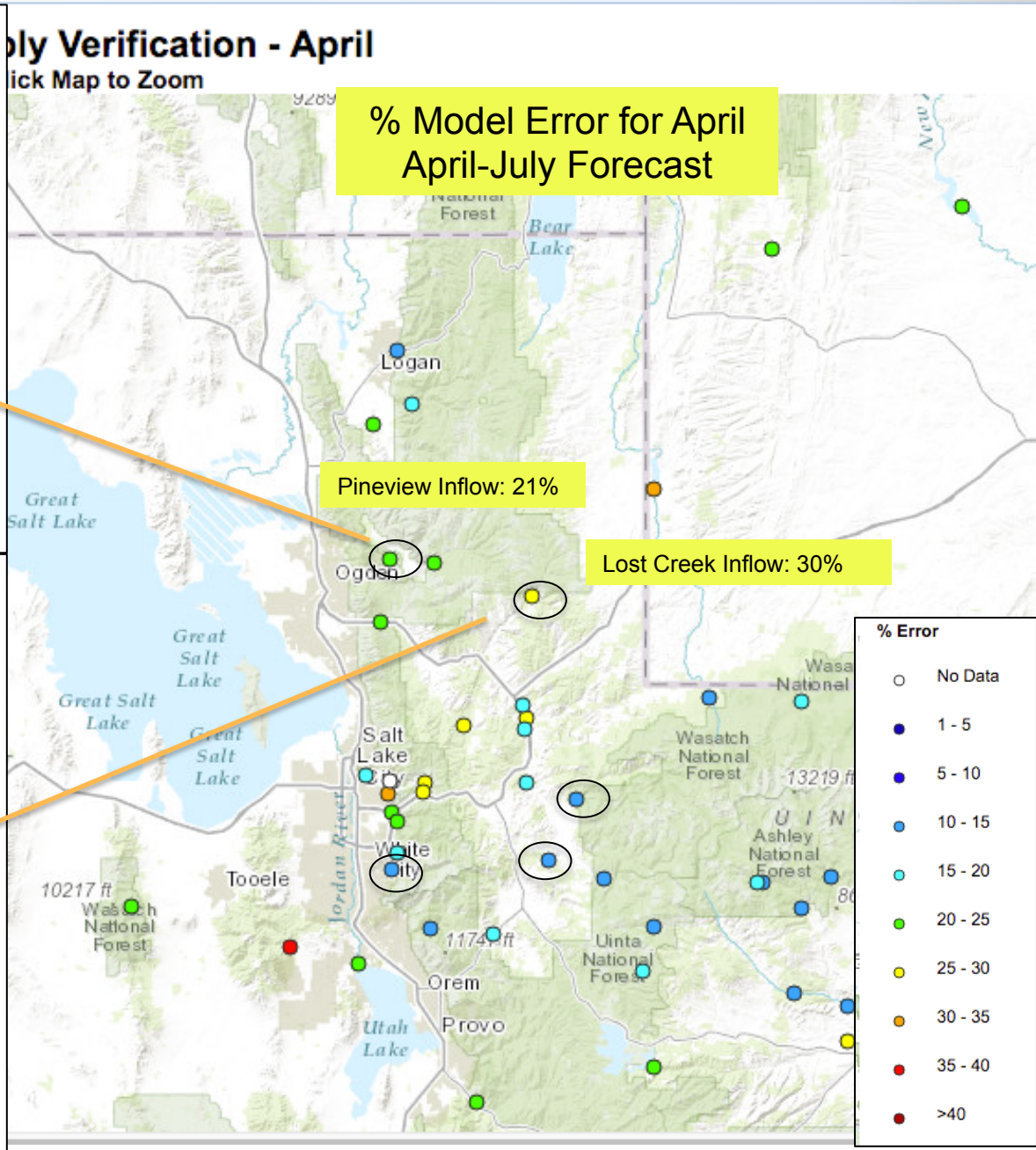
We Do Worse:
- Lower elevations (rain or early melt)
- Downstream of diversions / irrigation
- Little is known about diversions / demands

Sources of Uncertainty:
- Current conditions → model snow states
- Future weather

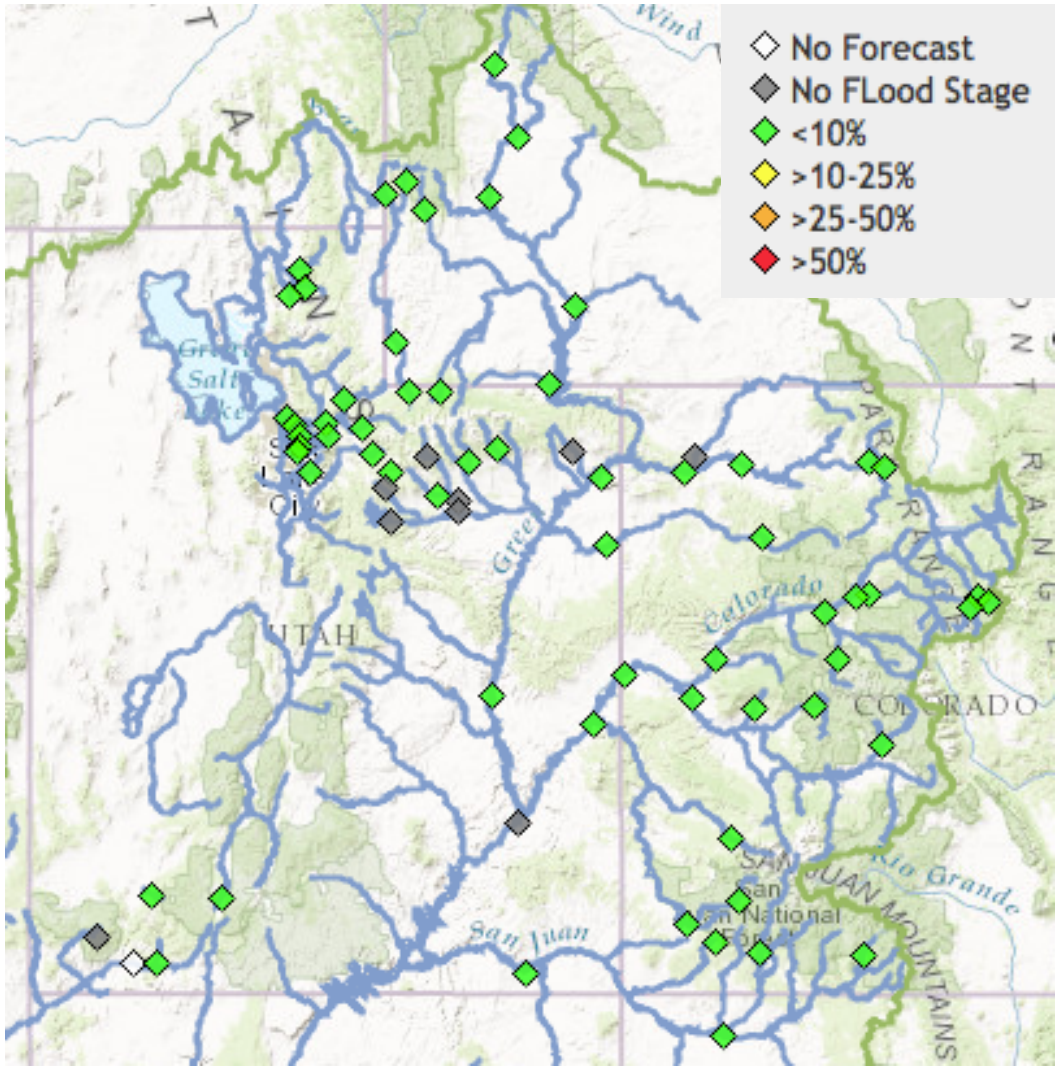
Forecast Accuracy ? How good is the model guidance in April ?







Peak Flow Forecast Summary (mean daily CFS)



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

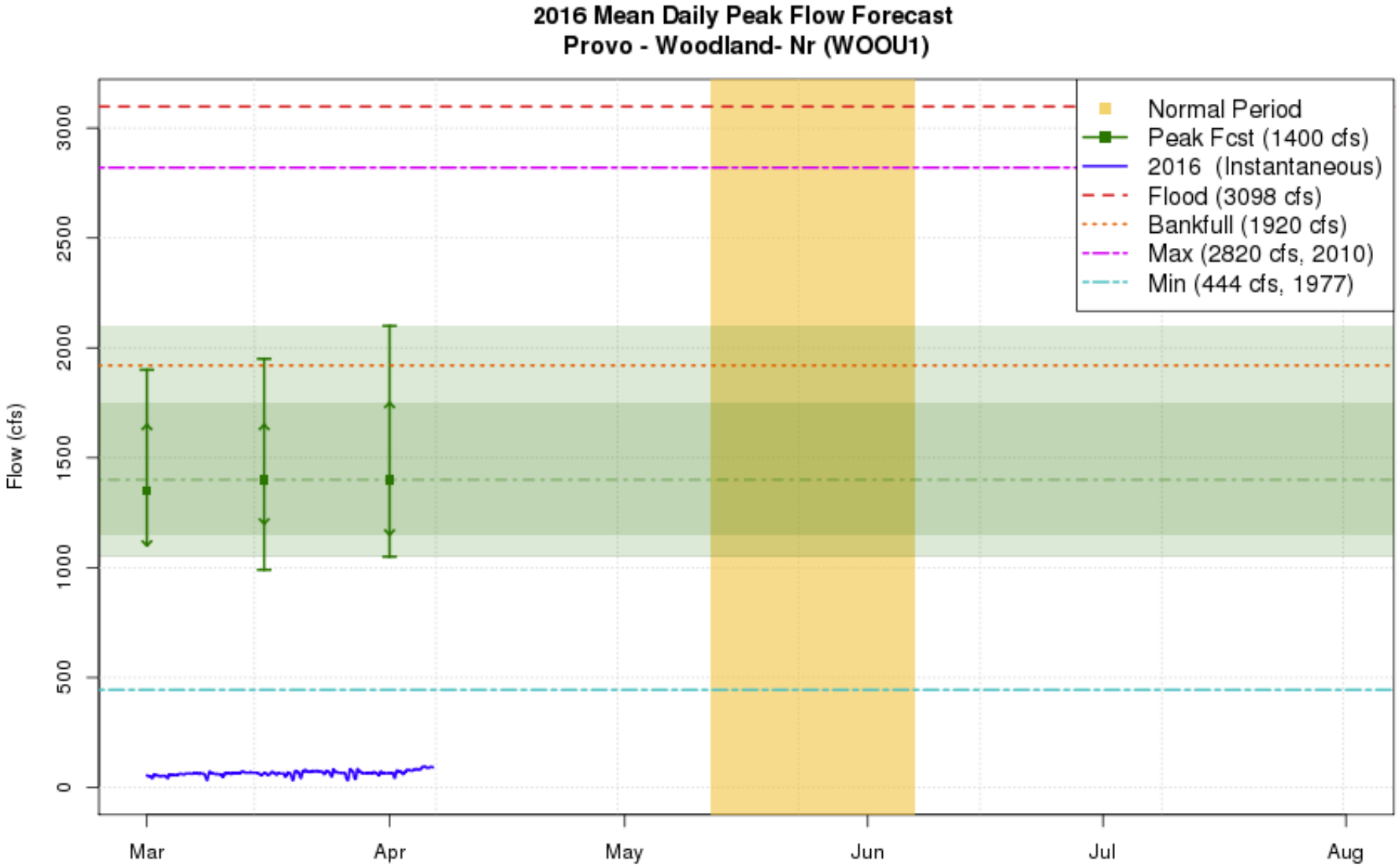
list: http://www.cbrfc.noaa.gov/rmap/peak/peaklist.php

Peak Flow Forecast Summary (mean daily CFS)

River	Location	Flood Flow	Mean Daily 90	Mean Daily 75	Mean Daily 50	Mean Daily 25	Mean Daily 10	Average Peak
Bear	Utah	*3718*	1000	1100	**1200**	1350	1650	1600
Bear	Evanston	*3245*	980	1050	**1200**	1550	1950	1815
Smiths Fork	Border	*3222*	530	590	**690**	770	840	895
Bear	Border	*3217*	930	1050	**1200**	1400	1800	1840
Logan	Logan	*1372*	650	710	**810**	950	1100	950
Blacksmith Fork	Hyrum	*903*	230	240	**290**	370	420	445
Little Bear	Paradise	*1150*	320	360	**430**	560	630	560
Weber	Oakley	*2510*	990	1100	**1250**	1400	1750	1645
Chalk Ck	Coalville	*1343*	210	250	**350**	520	570	560
Mcleod Ck	Park City	*151*	30	35	**40**	45	55	65
East Canyon Ck	Jeremy Ranch	*774*	75	80	**100**	110	150	180
Provo	Woodland	*3098*	1050	1150	**1400**	1750	2100	1795
American Fork	American Fork	*905*	120	150	**180**	200	270	320
Little Cottonwood Ck	Salt Lake City	*799*	230	260	**270**	320	380	455
Big Cottonwood Ck	Salt Lake City	*798*	180	210	**220**	280	330	430
Mill Ck	Salt Lake City	*156*	19	21	**30**	35	40	55
Emigration Ck	Salt Lake City	*130*	13	14	**16**	23	30	45
City Ck	Salt Lake City	*103*	30	35	**40**	55	65	80

www.cbrfc.noaa.gov - “Rivers drop down menu” – select peak flow information

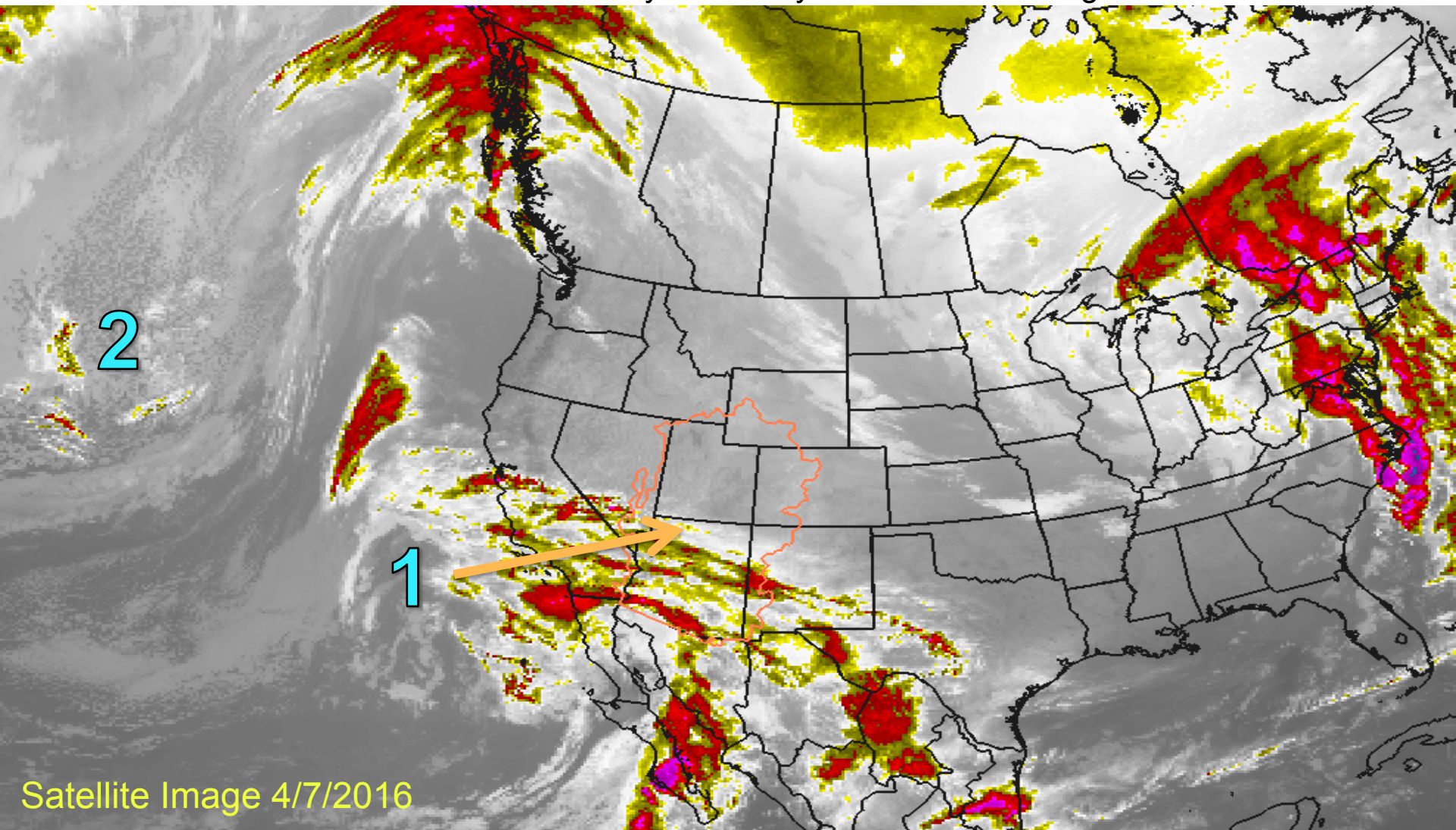
Peak Flow Forecast Summary (mean daily CFS)



Upcoming Weather – Active pattern but what's in it for us ?

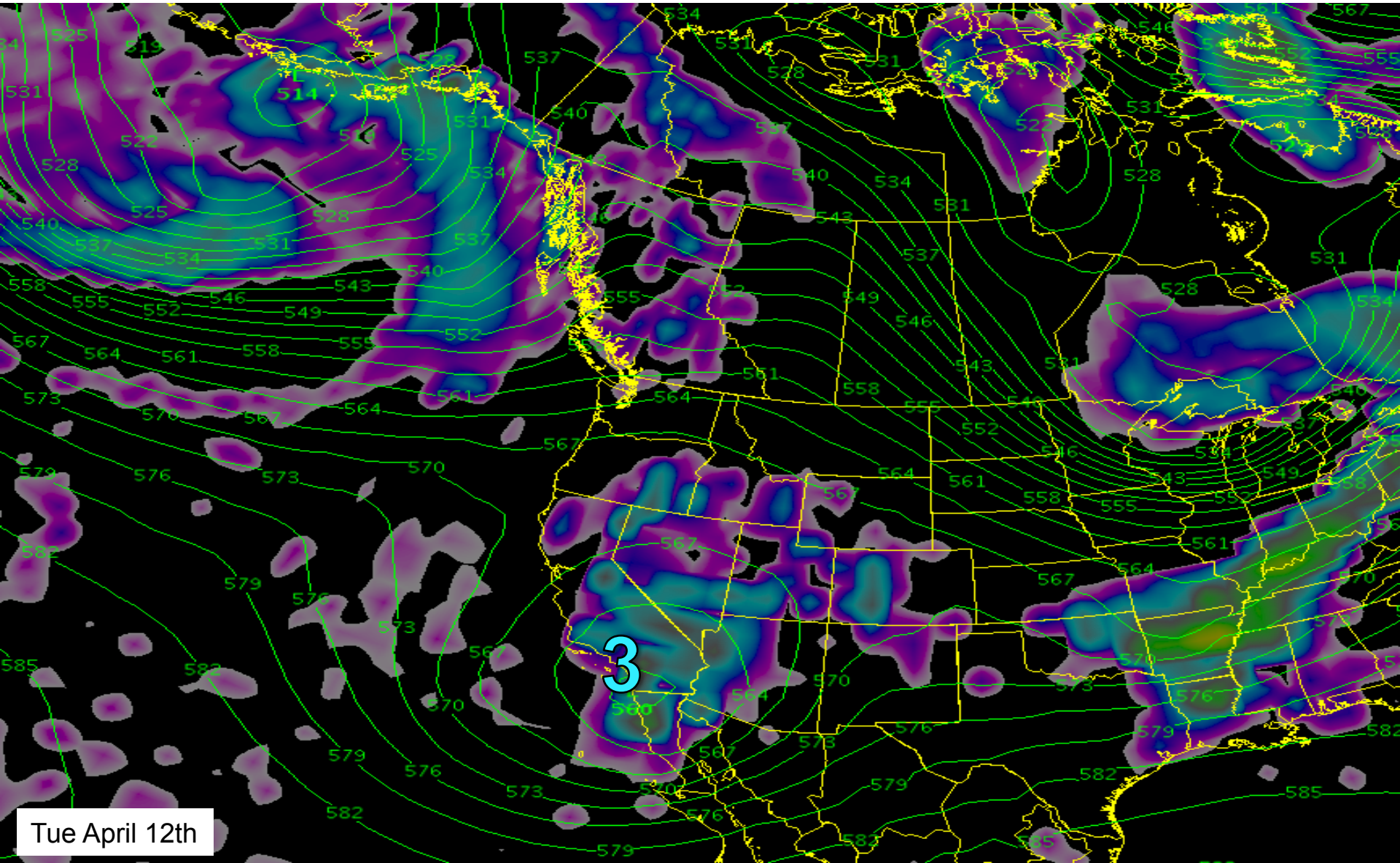
1 - Storm system will weaken and spread moisture / scattered showers into desert southwest through Friday. Warm system with rain at higher elevations.

2 – This will strengthen and follow the same path as storm 1. Scattered showers will increase over the entire area this weekend into Monday. Warm system with rain at higher elevations.



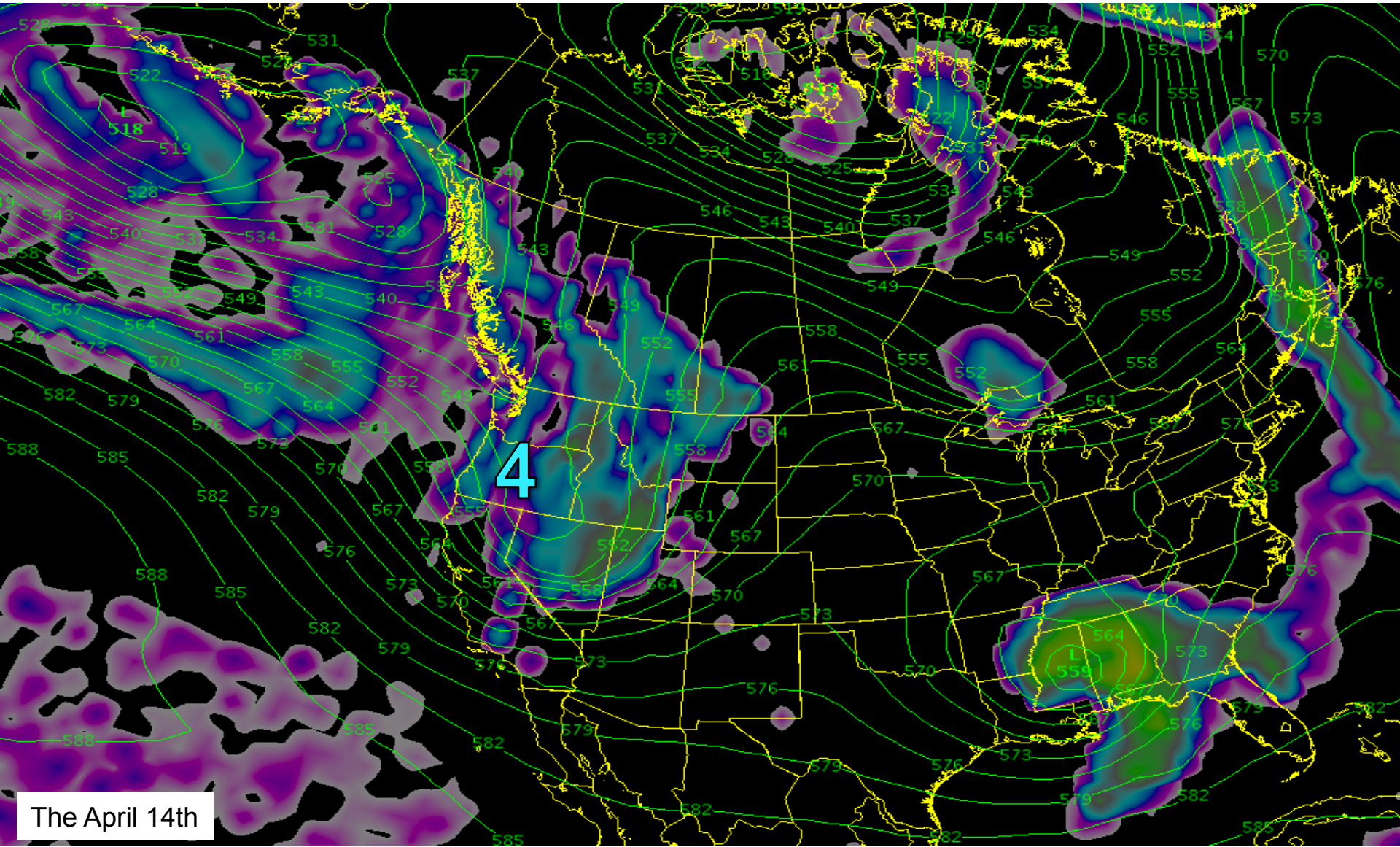
Weather outlook

3 – The third storm system moves through the southwest late Monday into Tuesday with a chance for scattered showers.

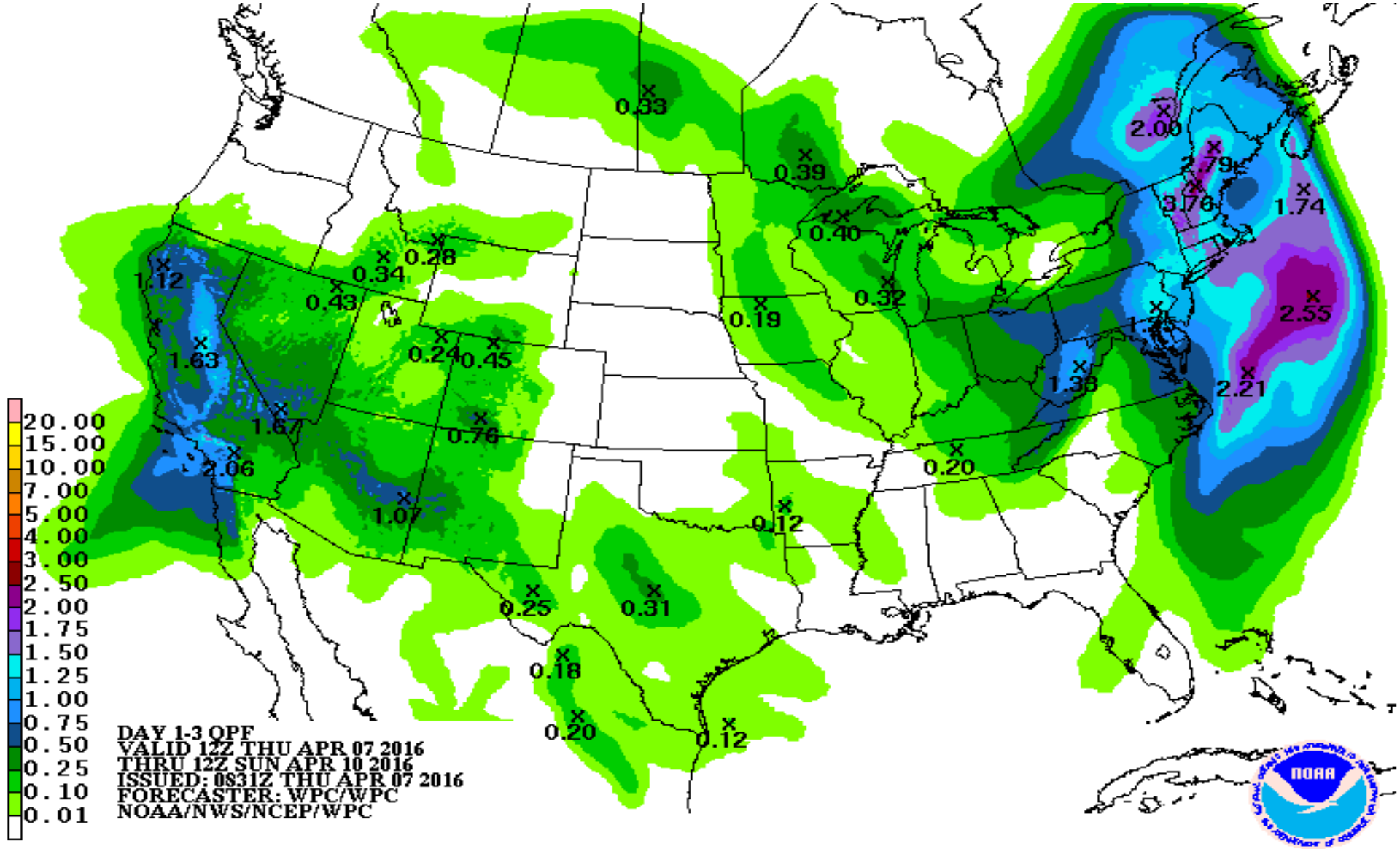


Weather outlook

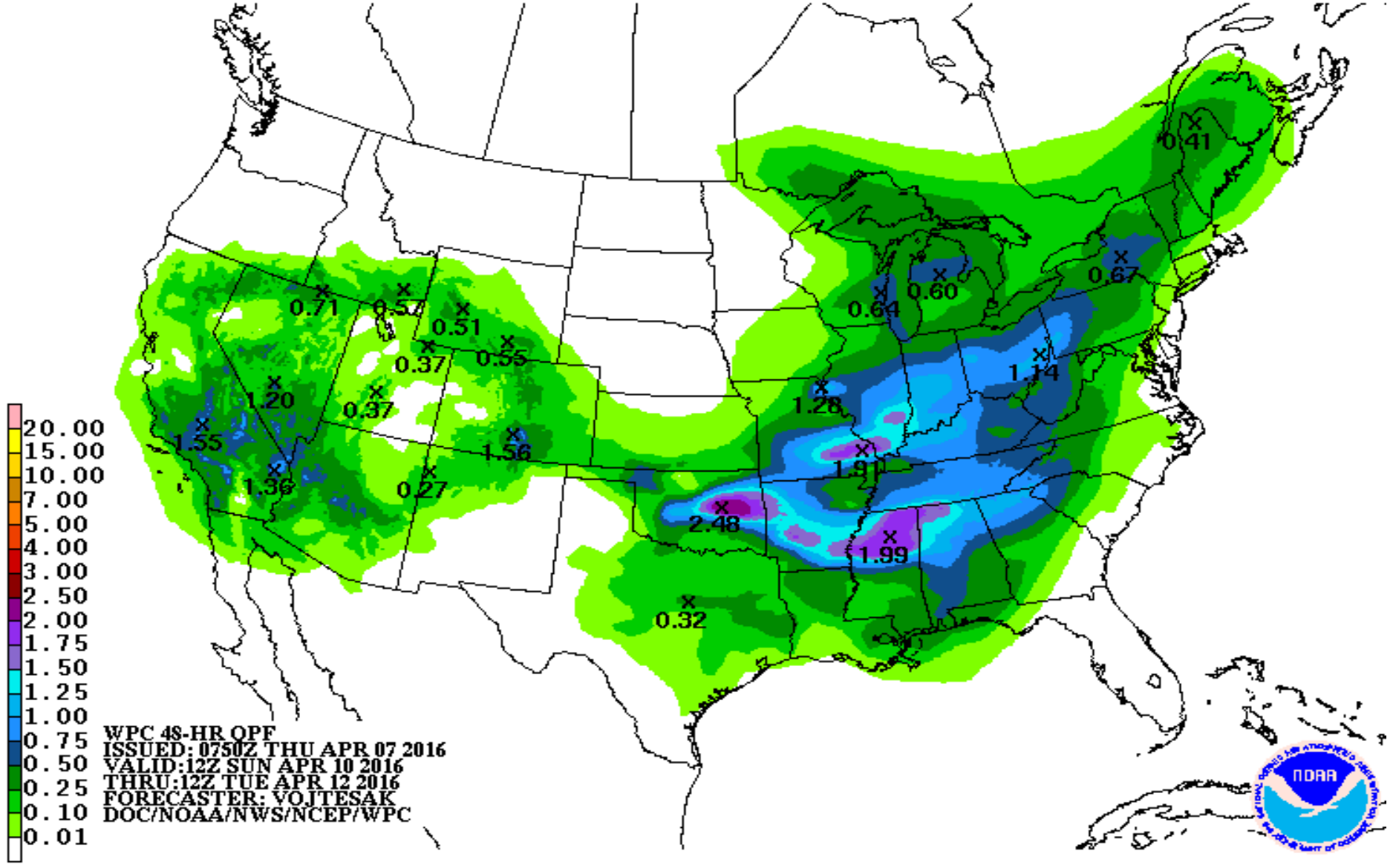
4 – A colder system is poised to move into the area toward the end of next week. Confidence in the track and strength of this system remains on the low side.



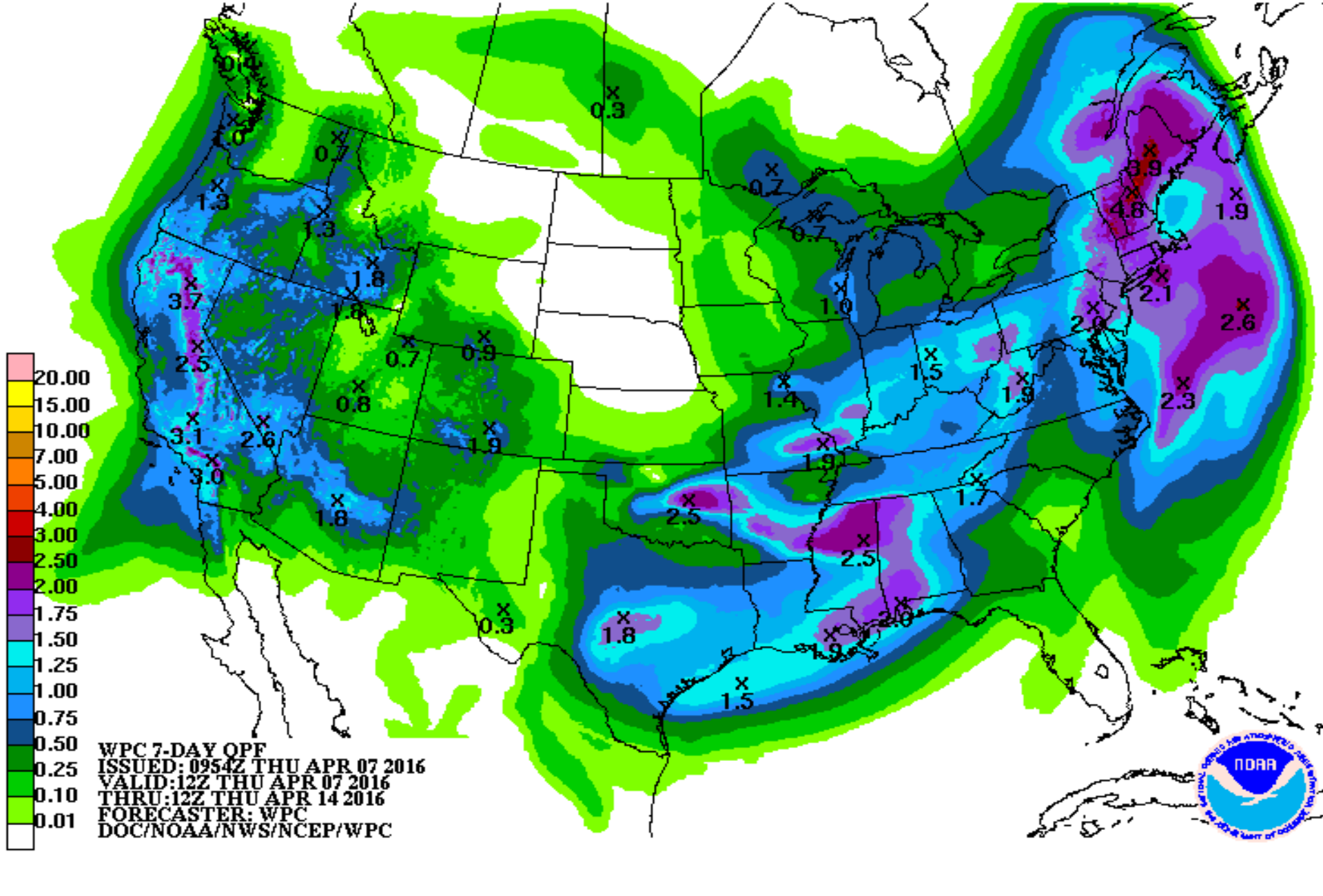
Precipitation Outlook: Thu Apr 7th – Sun Apr 10th



Precipitation Outlook: Sun Apr 10th – Tue Apr 12th

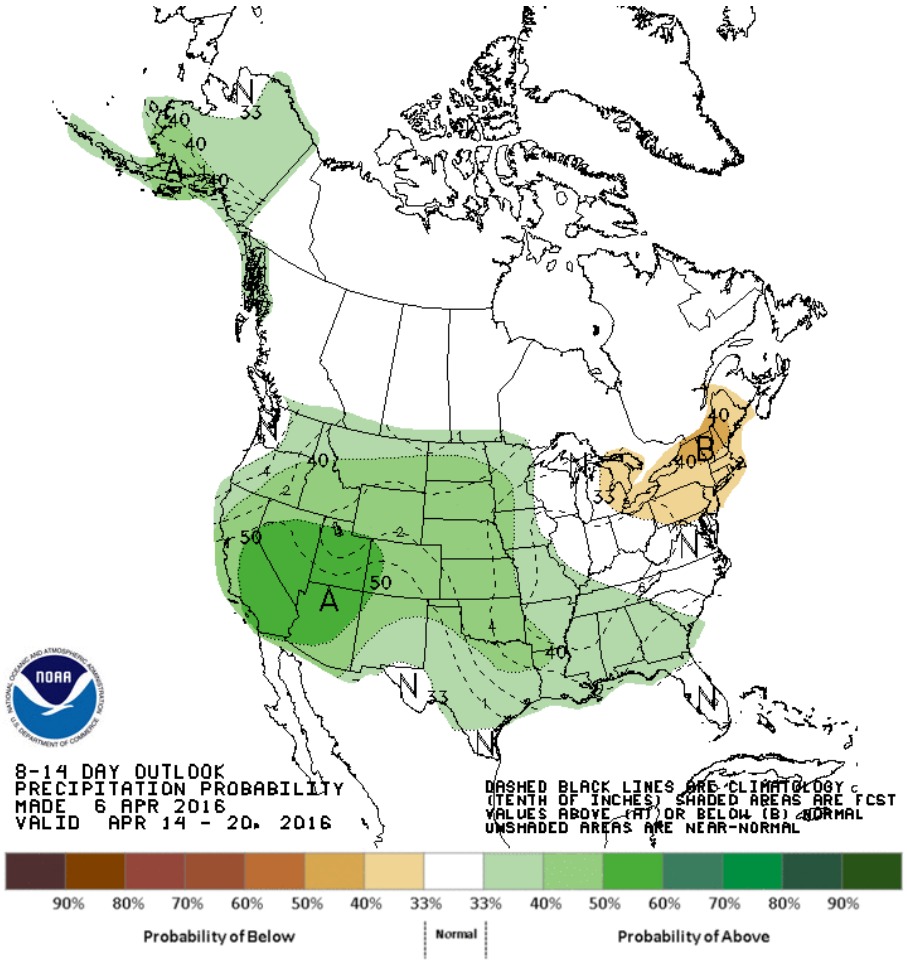


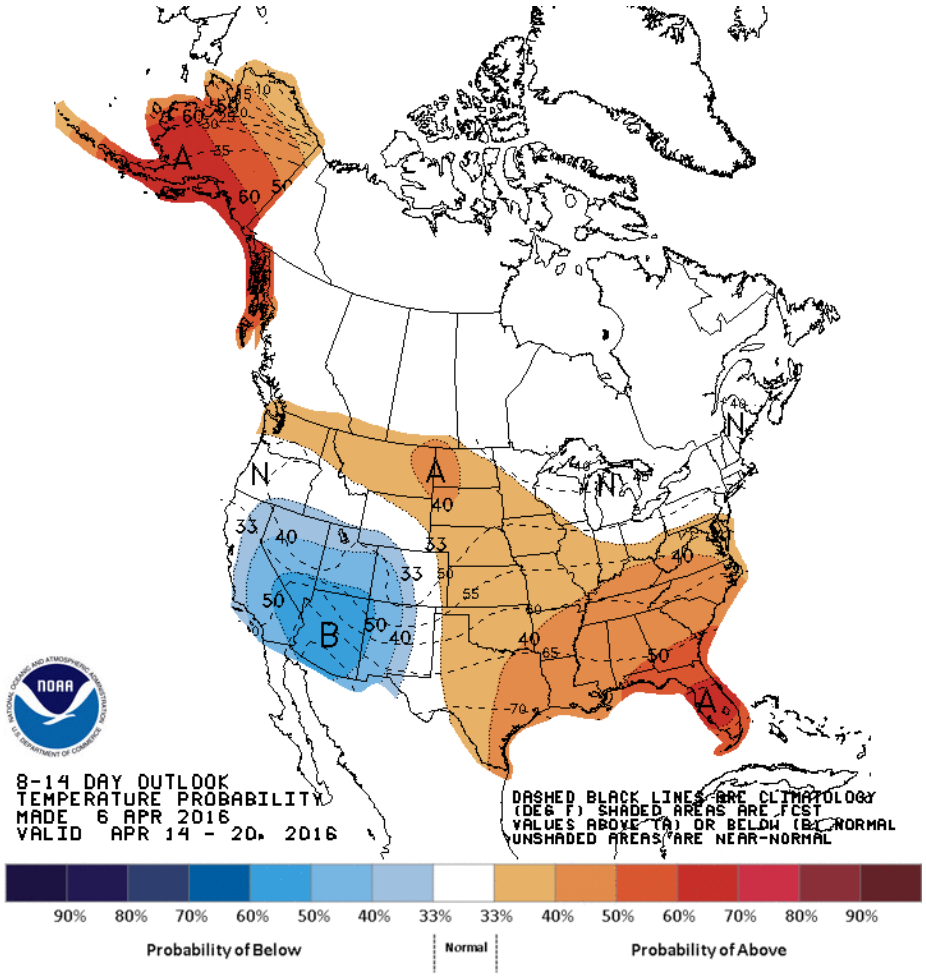
Precipitation Outlook: 7-Day Total (Apr 7th – Apr 14th)



Weather outlook: April 14th – April 20th

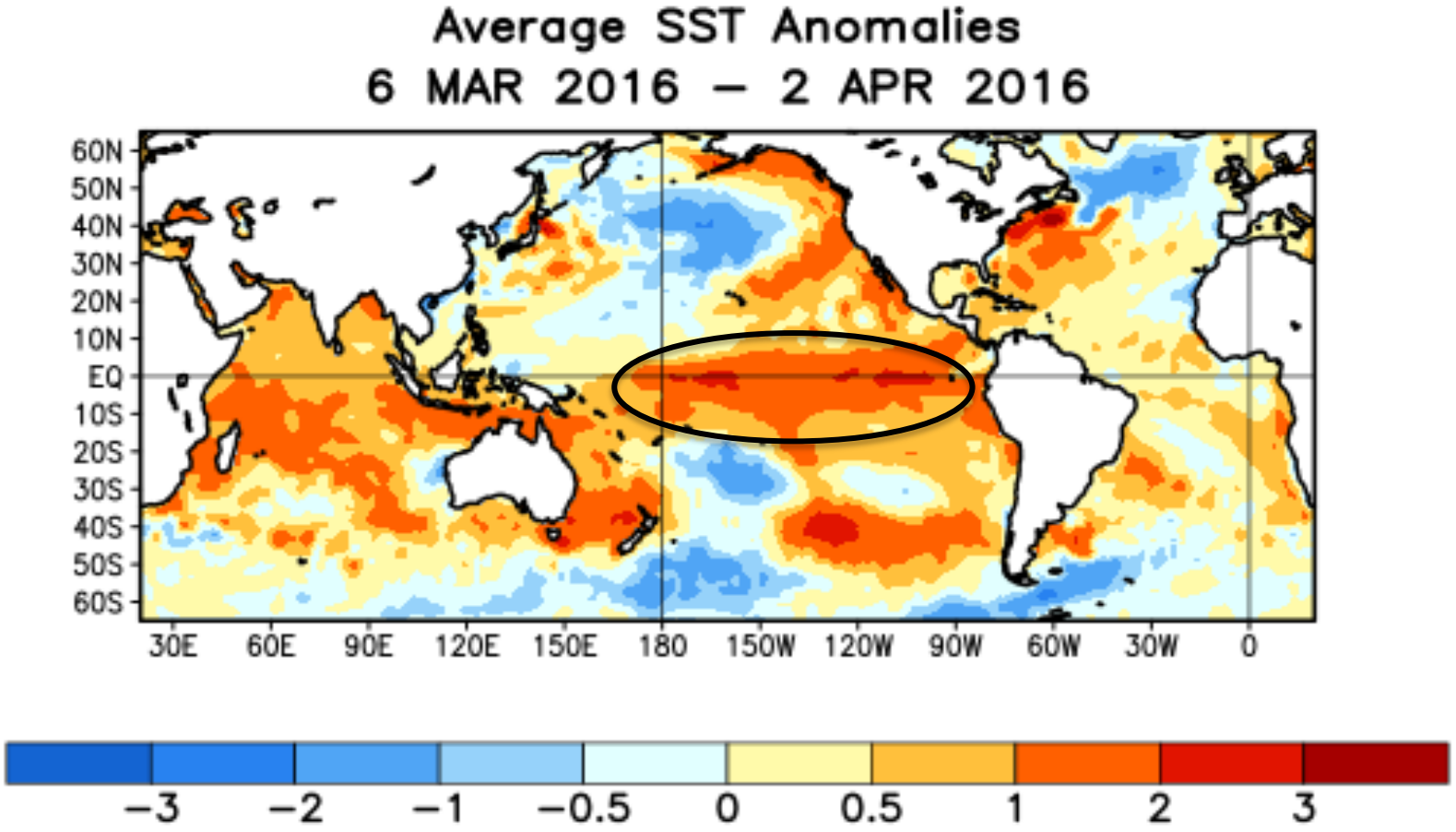
Climate Prediction Center
8-14 day outlook





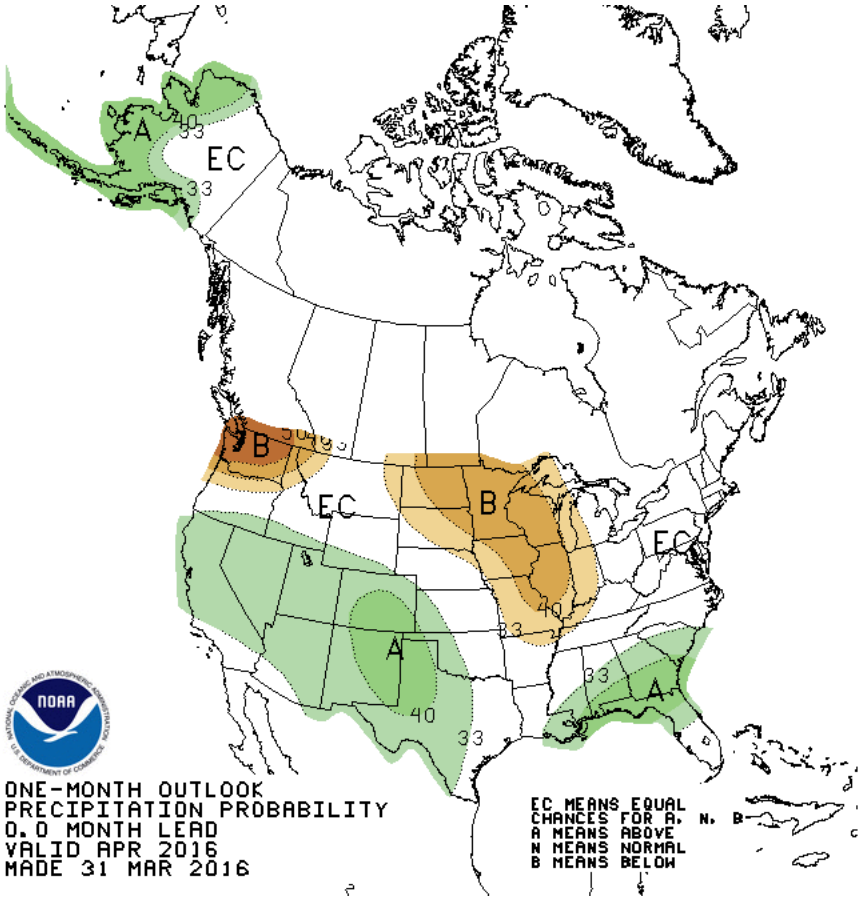
El Niño Event

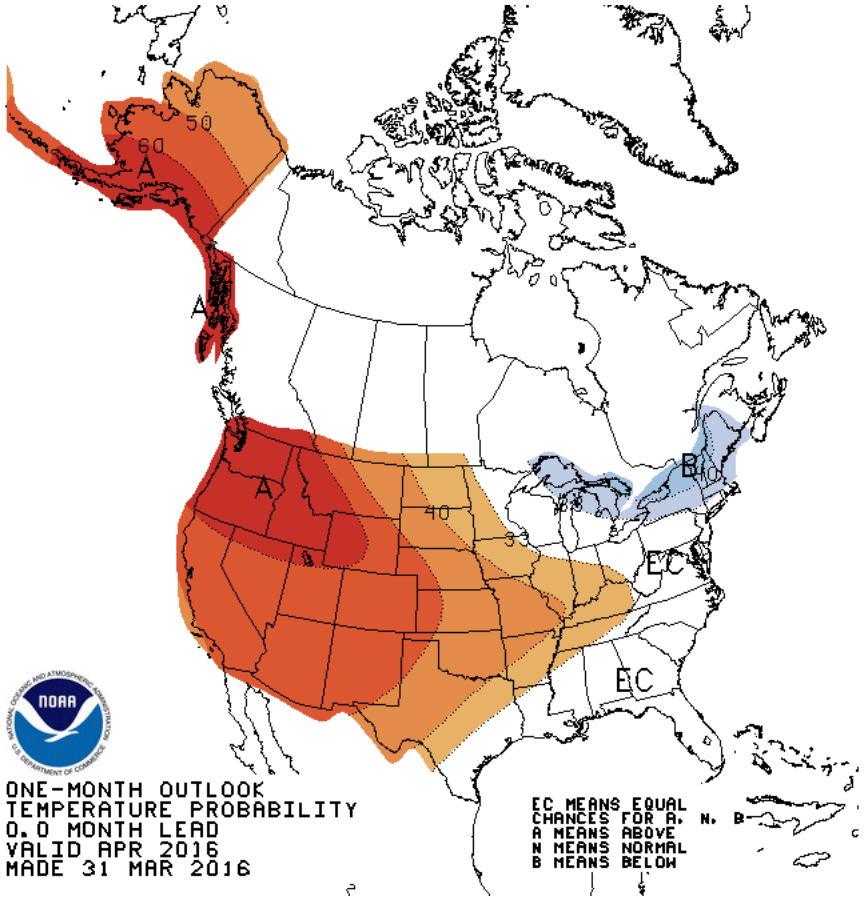
- Still a strong event but has been weakening over the past several weeks.
- The 2015-2016 will go down as one of the strongest on record (82-83, 97-98)
- Impacts the Jet stream strength, location, and storm tracks (favors LC Basin)
- No solid correlation between ENSO and April-July runoff volumes in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



Long range outlook: Climate Prediction Center

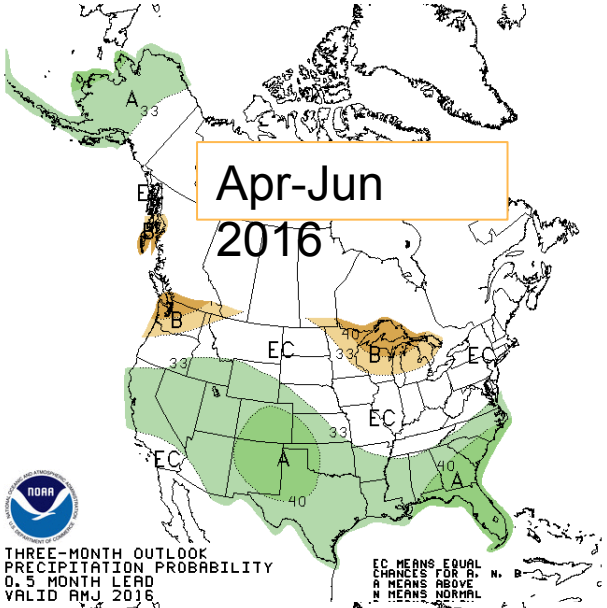
Climate Prediction Center 30 Day Outlook for April 2016

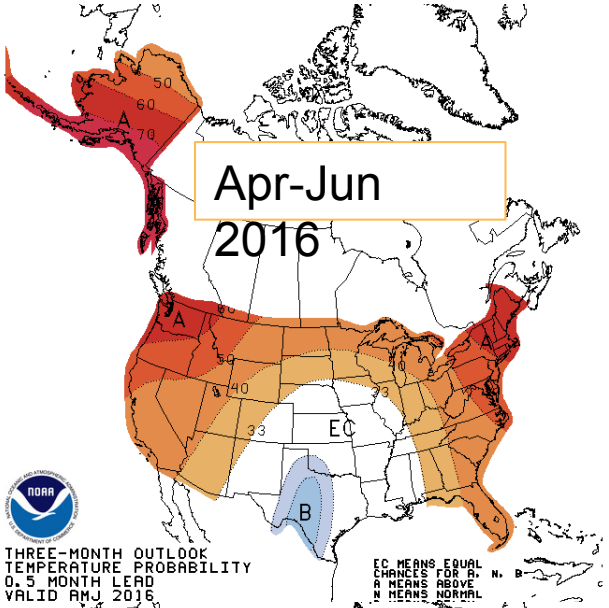


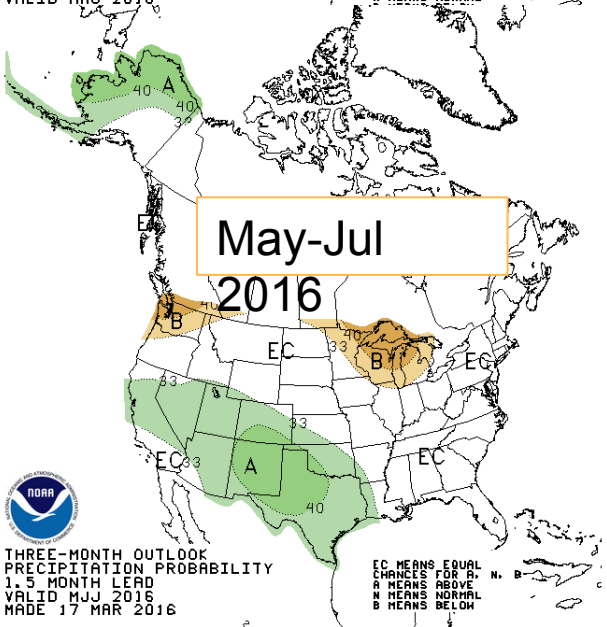


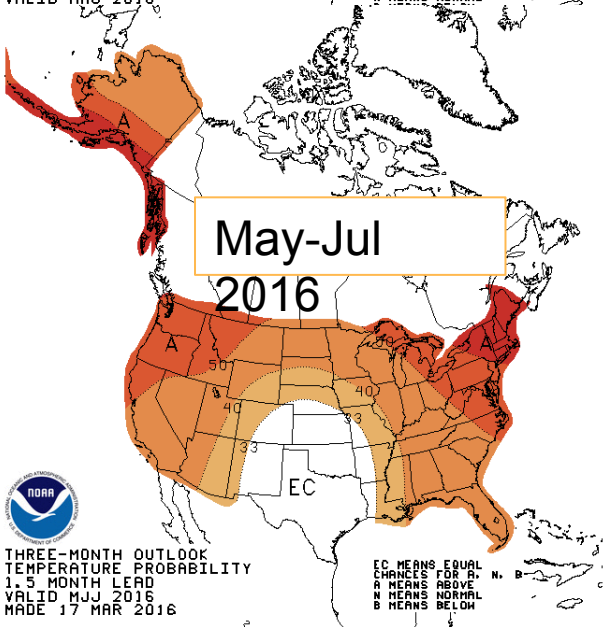
Long range outlook: Climate Prediction Center

Climate Prediction Center – 3 month outlooks









Conclusions

Today's summary:

- Dry soil moisture conditions are having a negative impact on forecasts (10-15% of avg)
- March was generally beneficial, particularly in farther north in the Great Basin.
- Water supply forecasts increased in the Bear, parts of the Weber, and Provo headwaters
- Not likely we will see average runoff conditions – we would need an unusual spring.
- Weather pattern looks active and suggests additional precipitation / mountain snow.
- El Niño is still present but weakening and is impacting long range climate outlooks.

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Brent Bernard brent.bernard@noaa.gov

Sevier River Basin water supply focal point: Tracy Cox tracy.cox@noaa.gov

Upcoming Briefings:

5/5 @ 1 pm MDT Colorado River Basin Water Supply
5/6 @ 10 am MDT Great Basin Water Supply

Today's slides available online: www.cbrfc.noaa/gov/present/present2016.cgi