

# Great Basin April 2016 Water Supply Briefing

1 pm April 7, 2016

Greg Smith - Sr. Hydrologist

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:

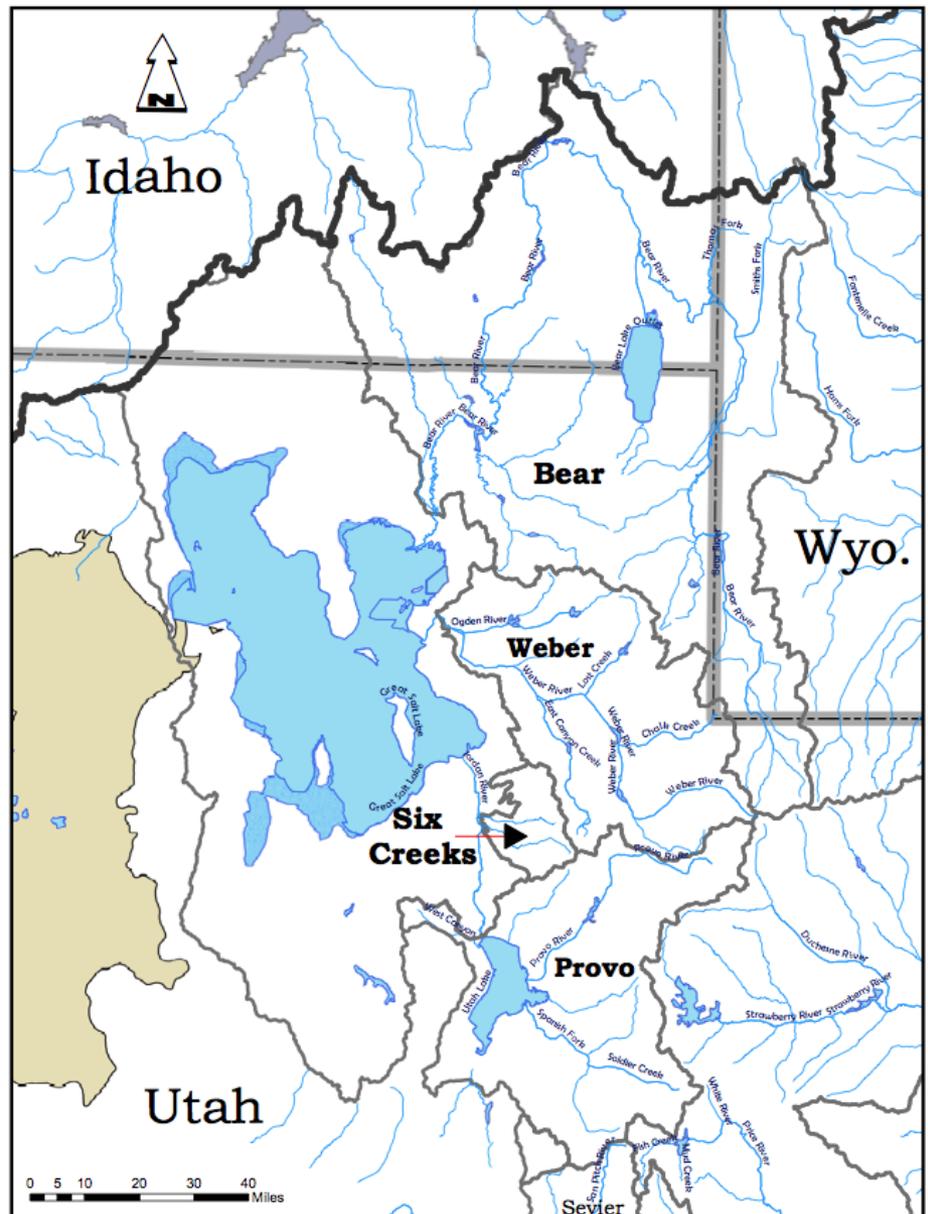
Primary focus is on the Bear, Weber, Six-Creeks, Provo/UT Lake river basins.

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.

Great Basin Water Supply Forecast Basins

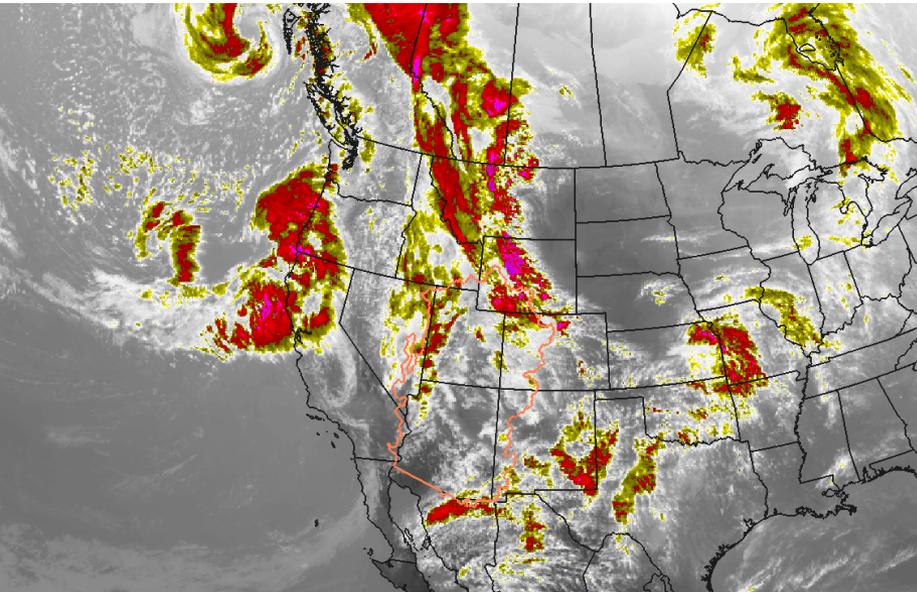


# Today's Presentation – Questions to Answer

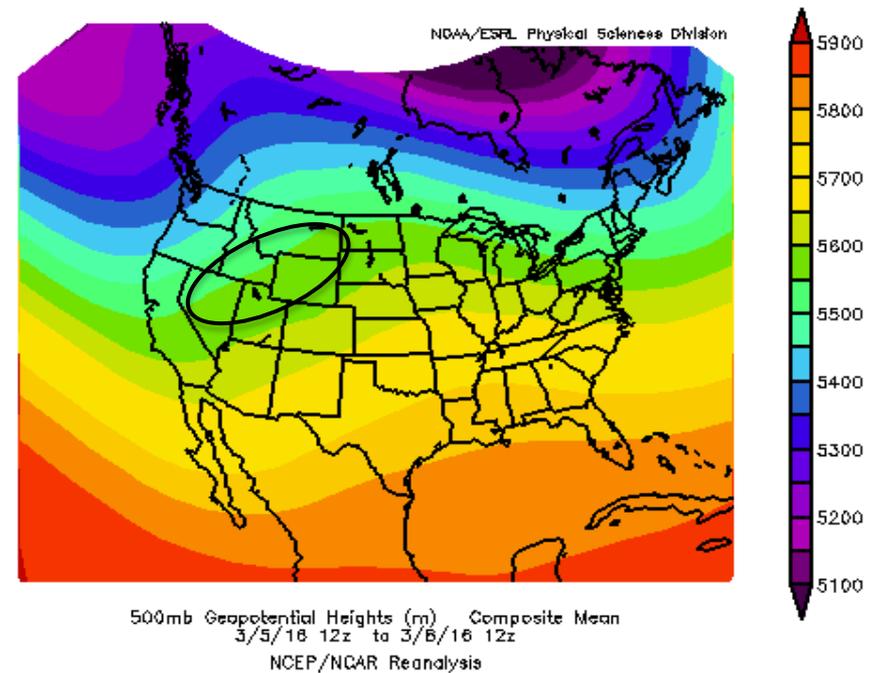
- **Some forecast increased, others decreased, how beneficial were the March storms ?**
  - March weather pattern.
  - March and water year precipitation.
  - Where snowpack conditions improved or worsened.
- **Trend in the water supply forecasts between last month and this month**
- **The water supply 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 6<sup>th</sup> satellite image



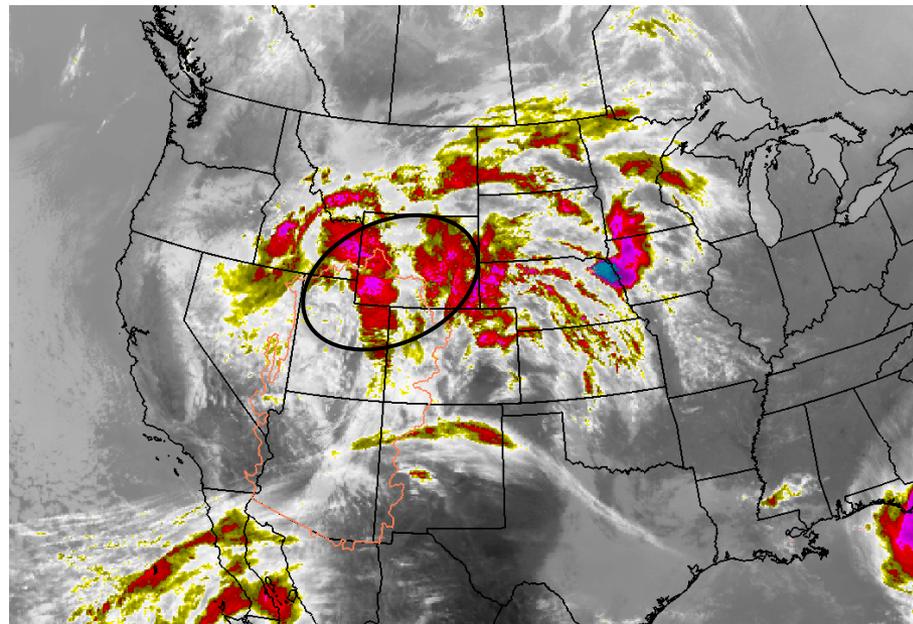
March 5<sup>th</sup>- 8<sup>th</sup> upper atmosphere pattern



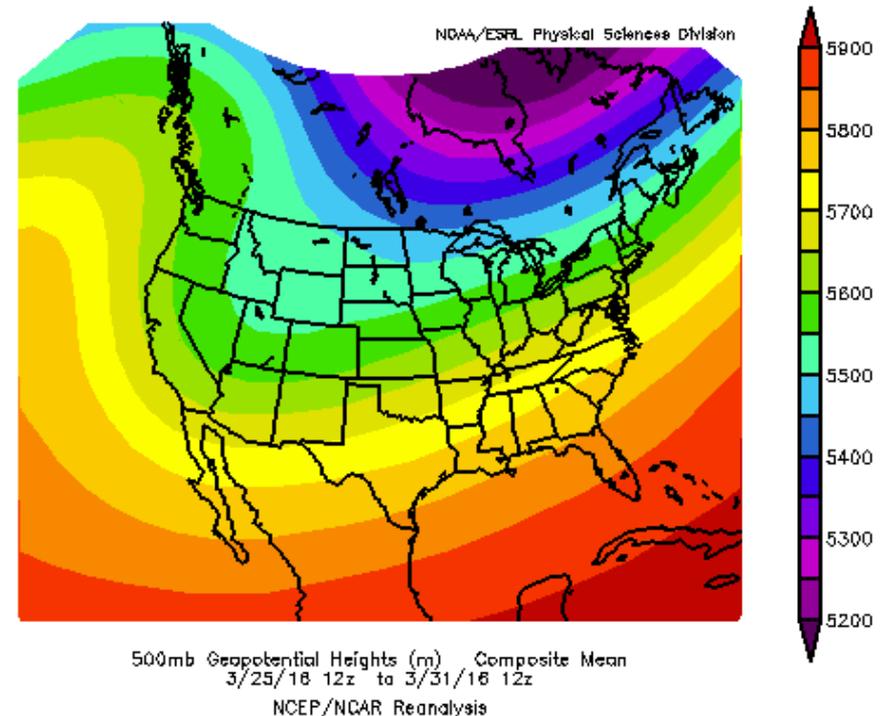
March was active however primary impacts were in the northern areas

# March 2016 Weather Pattern

March 29<sup>th</sup> satellite image

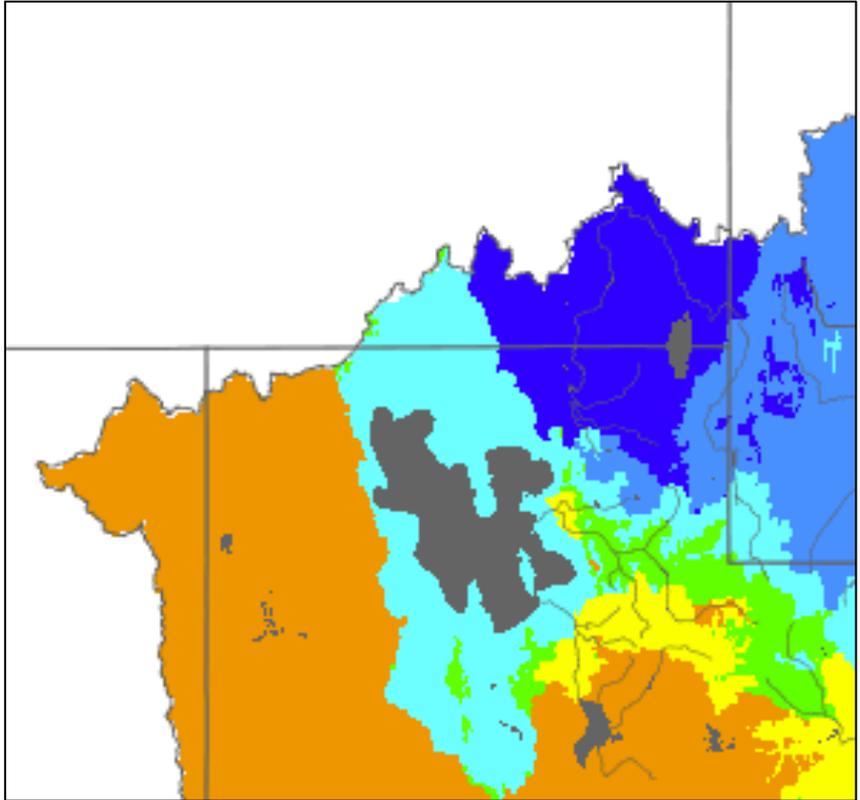


March 25<sup>th</sup>- 31<sup>st</sup> upper atmosphere pattern



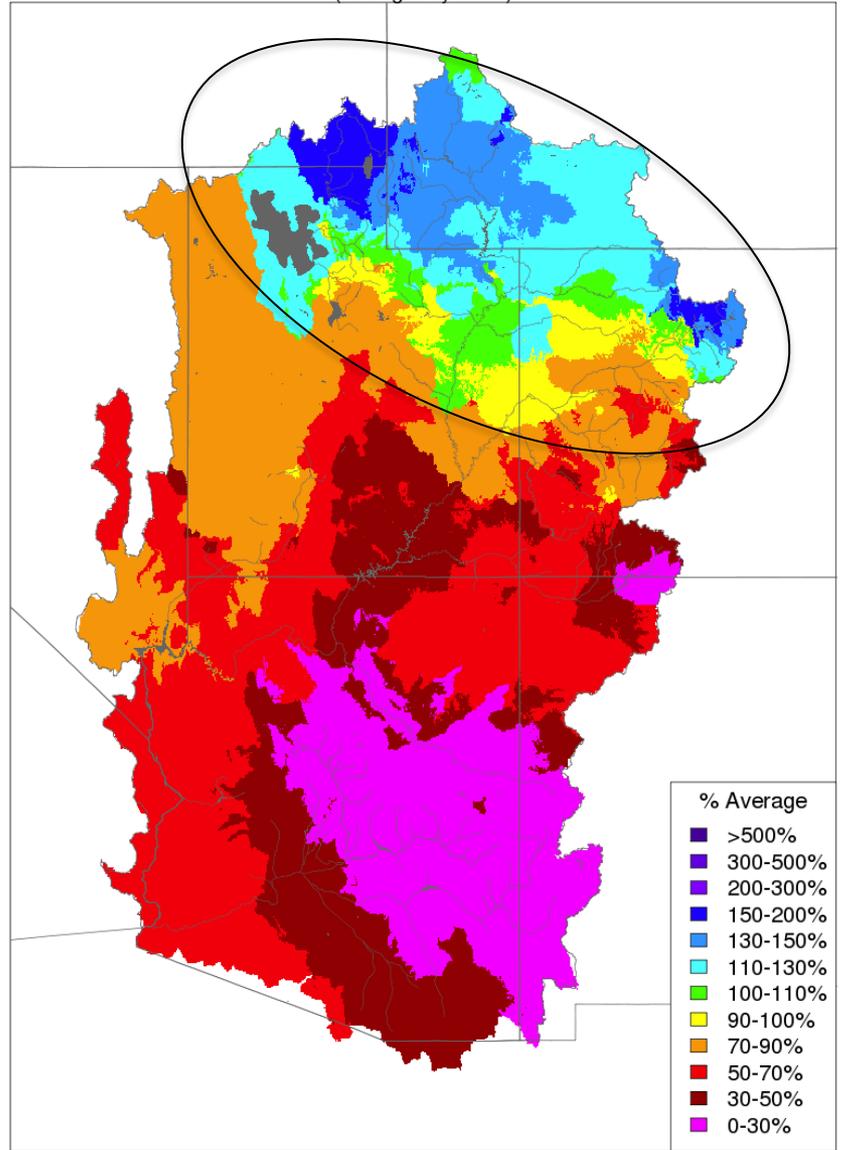
Large slow moving system at the end of March improved snow conditions at several northern locations

# March 2016 Precipitation



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

Monthly Precipitation - March 2016  
(Averaged by Basin)

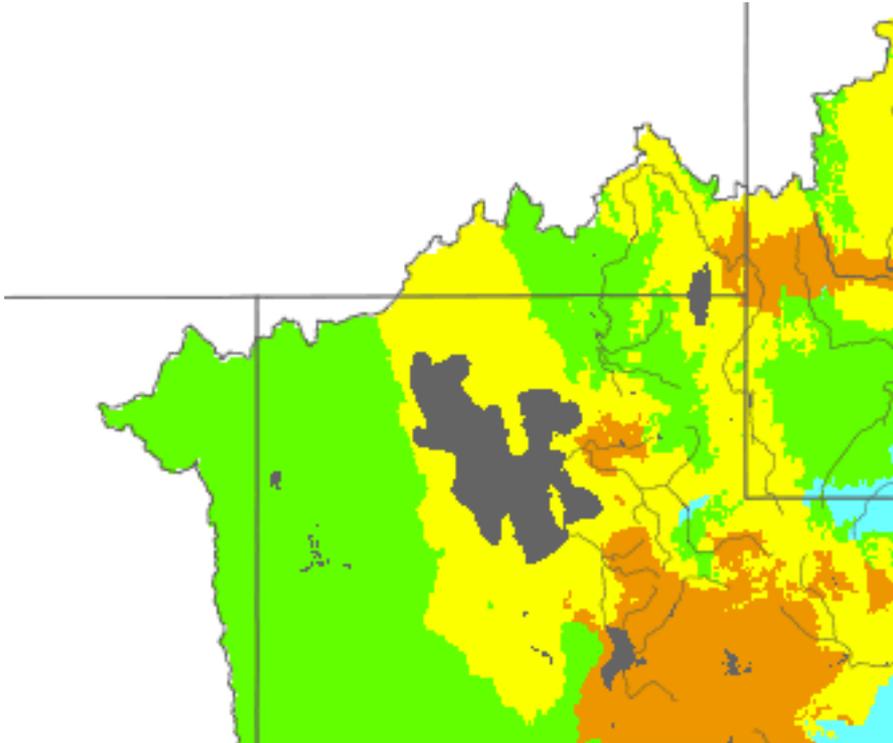


- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%

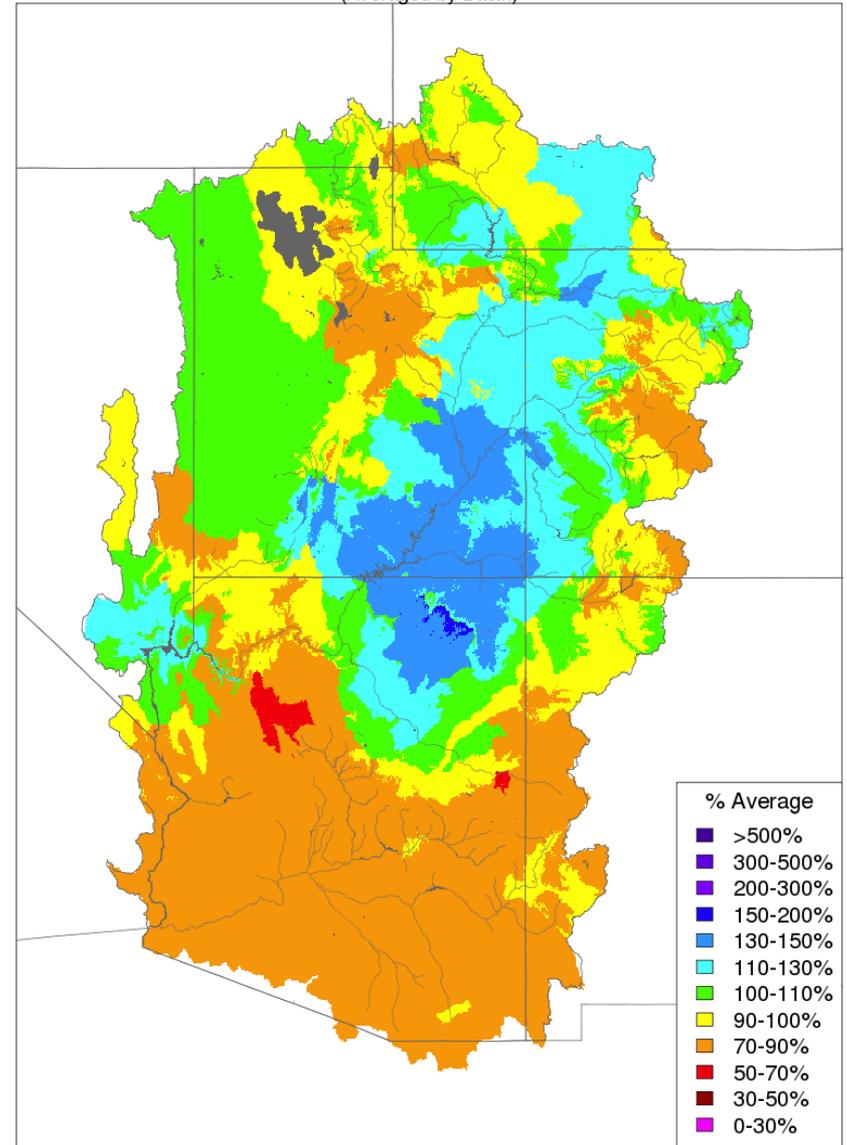
Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

# Water-Year (Oct-Mar) 2016 Precipitation

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



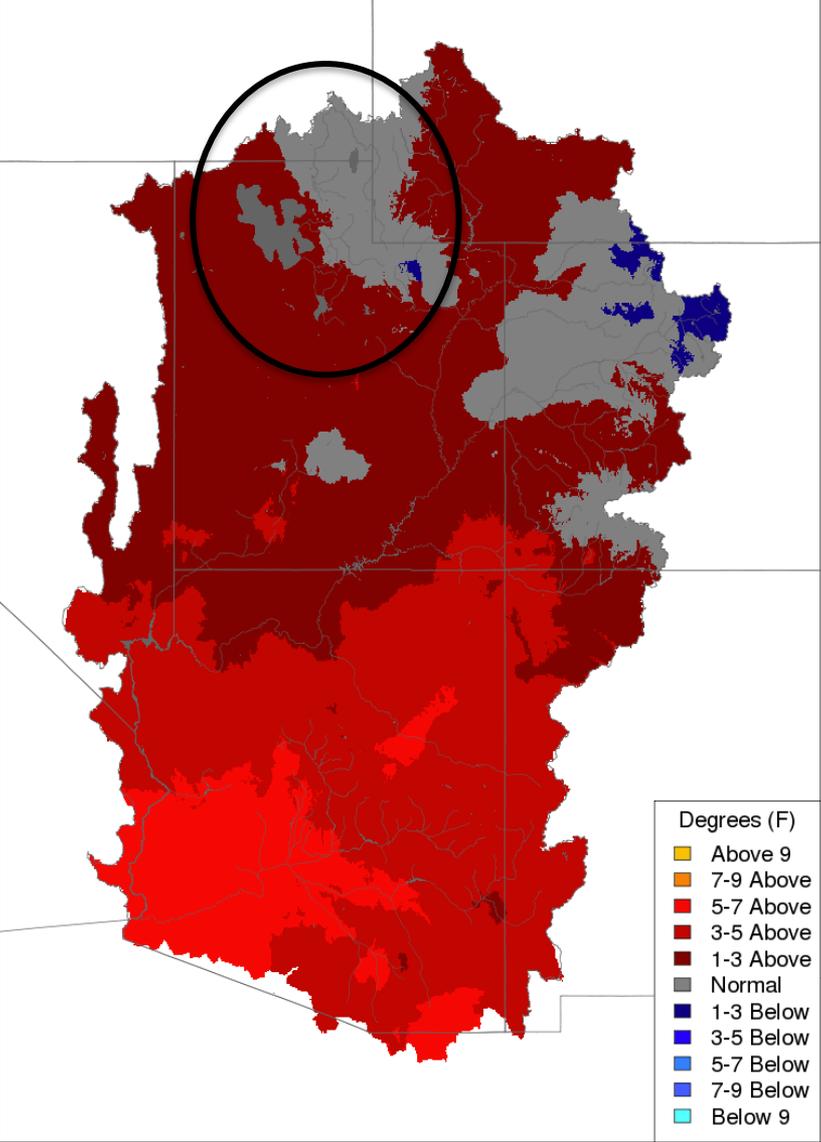
Bear :	100%
Weber:	95%
Six Creeks:	85%
Provo/UT Lake:	85%



# March 2016 Temperatures

### Max Temp - Monthly Deviation - March 2016

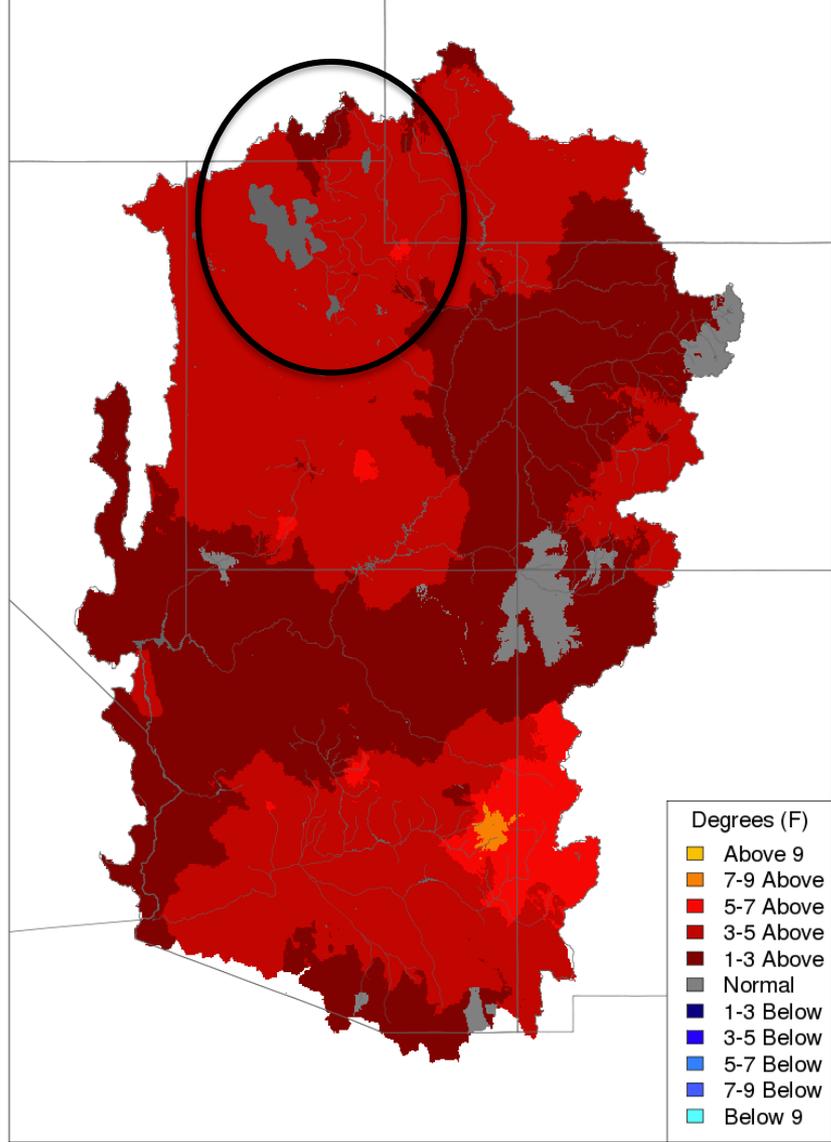
(Averaged by Basin)



Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

### Min Temp - Monthly Deviation - March 2016

(Averaged by Basin)

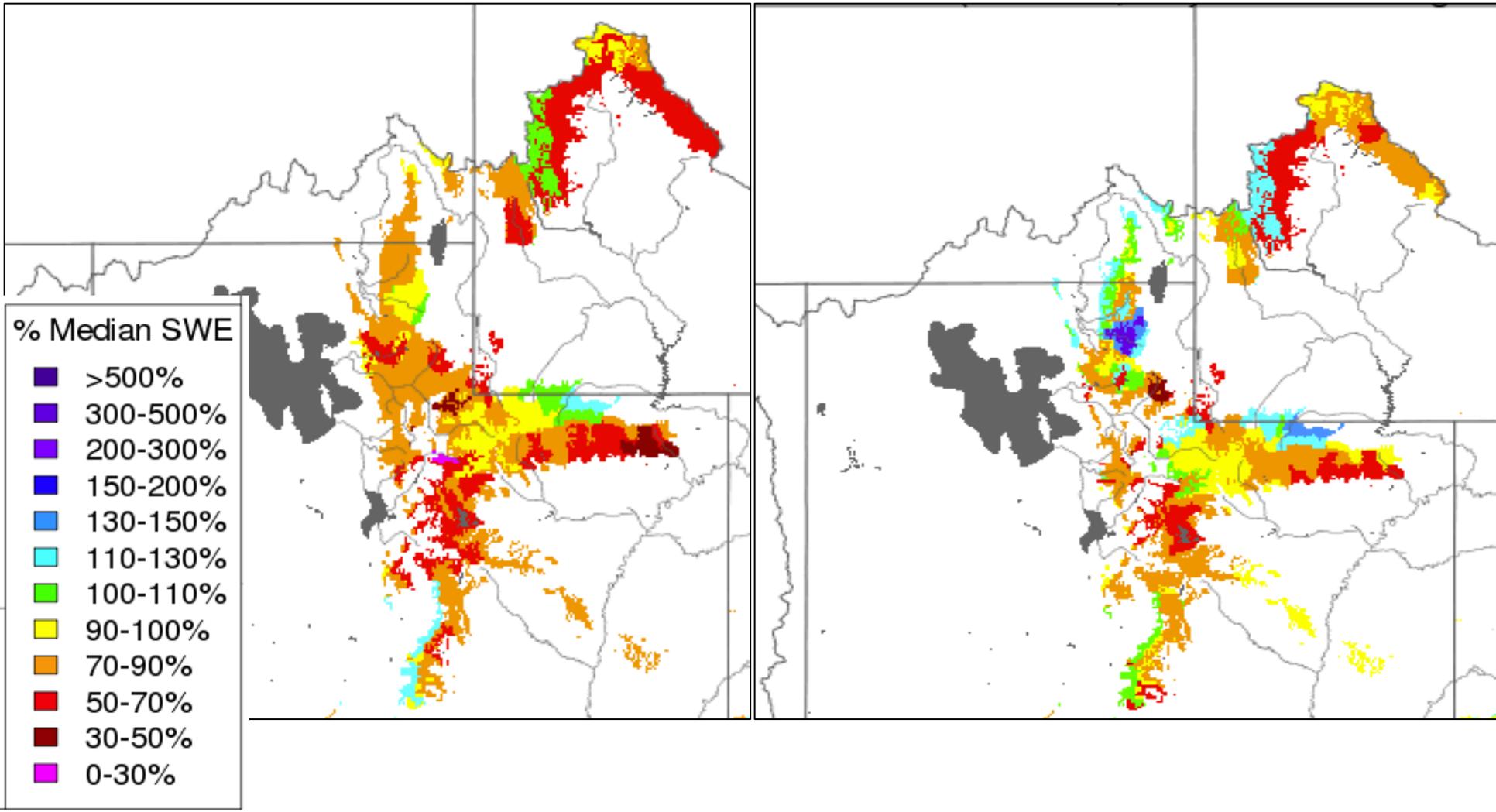


Prepared by NOAA, Colorado Basin River Forecast Center  
Salt Lake City, Utah, [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov)

# Snow - CBRFC Hydrologic Model

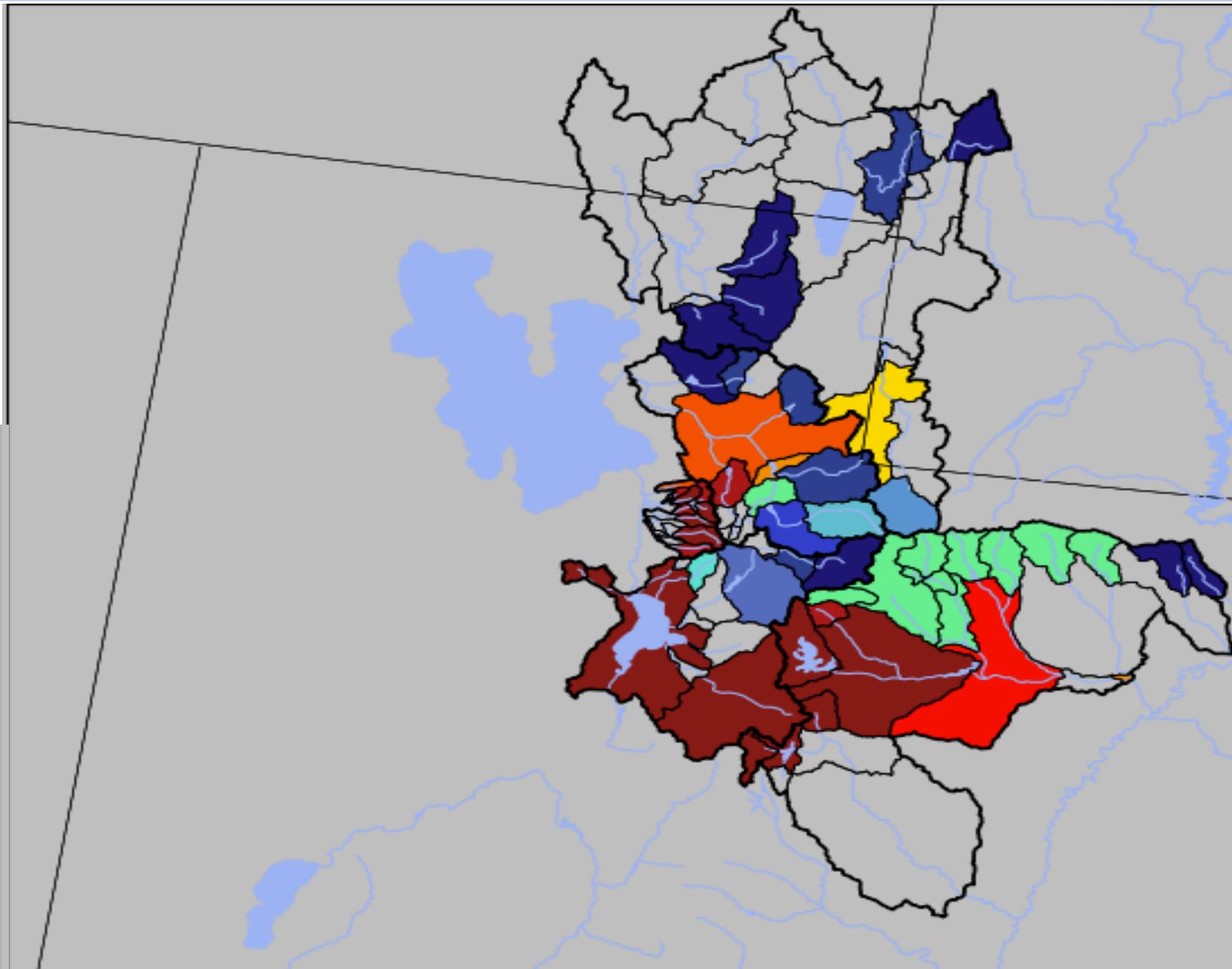
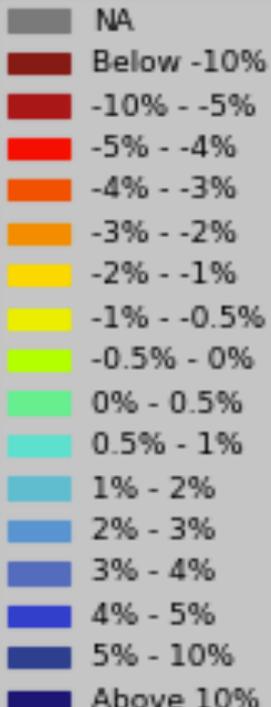
March 6<sup>th</sup> 2016  
Significant Runoff Areas

April 6<sup>th</sup> 2016  
Significant Runoff Areas

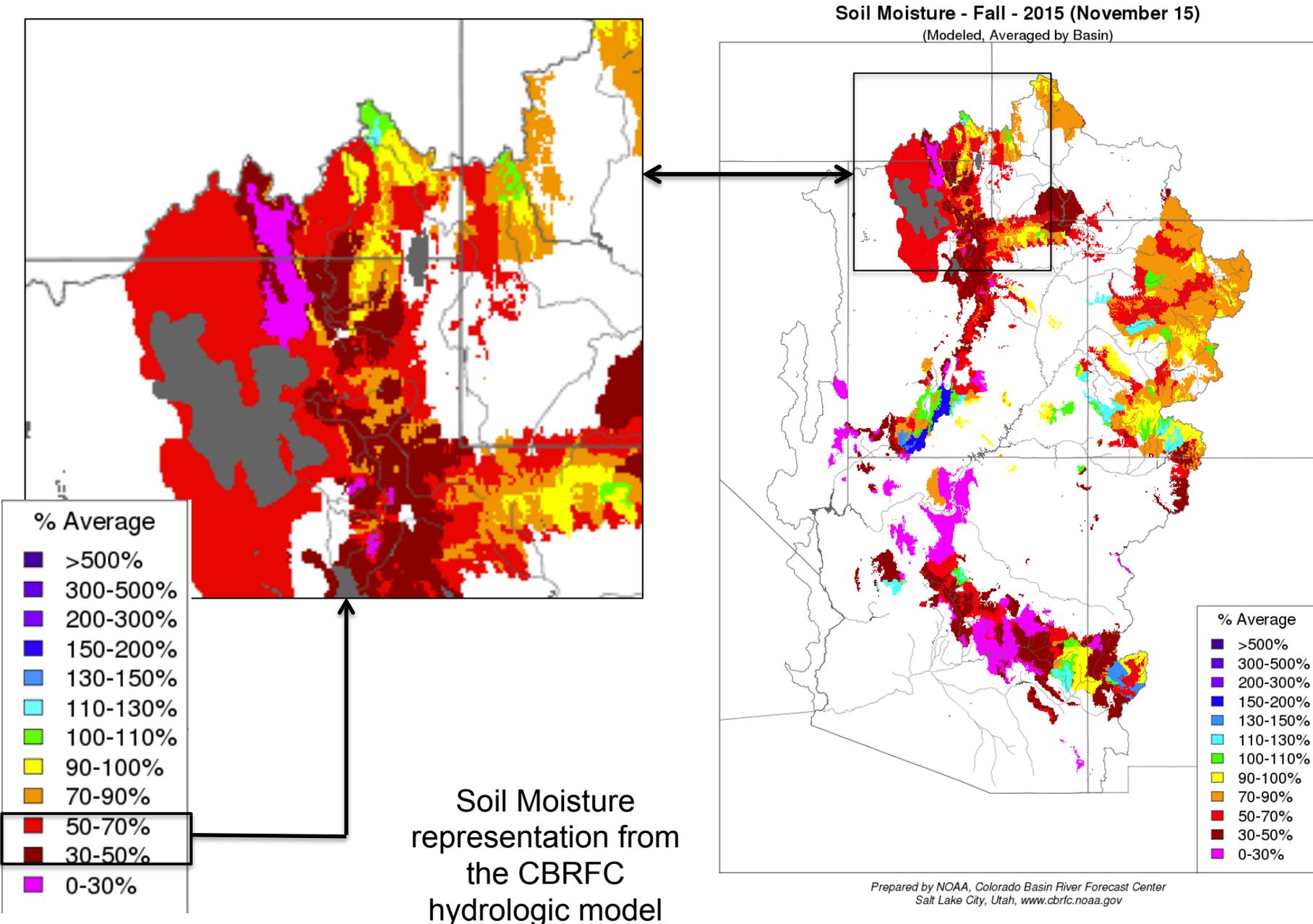


# Water Supply Forecast Trend – March 1<sup>st</sup> to April 1<sup>st</sup>

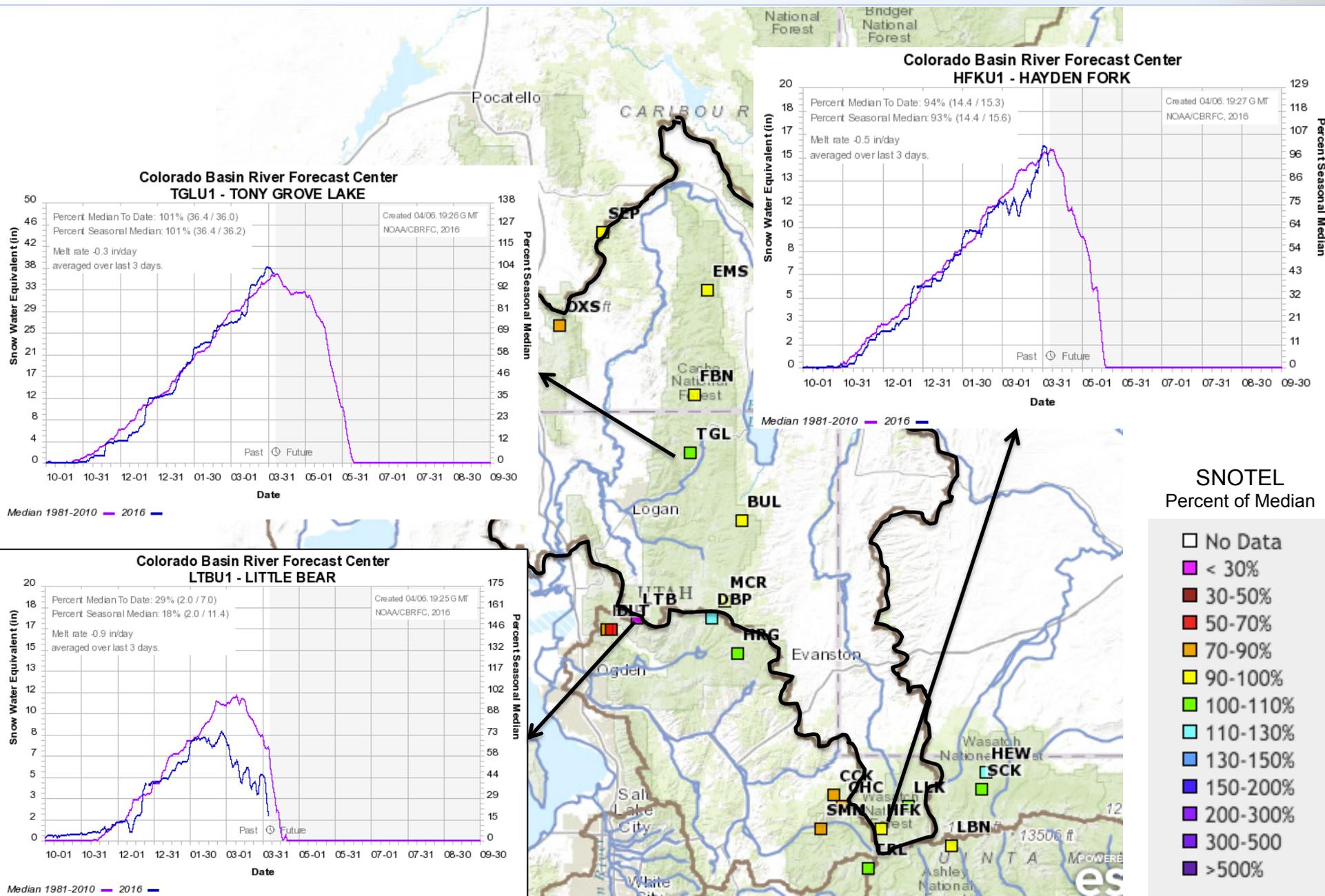
Percent of Average Change



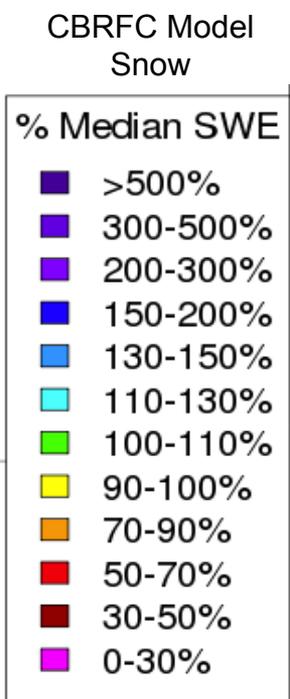
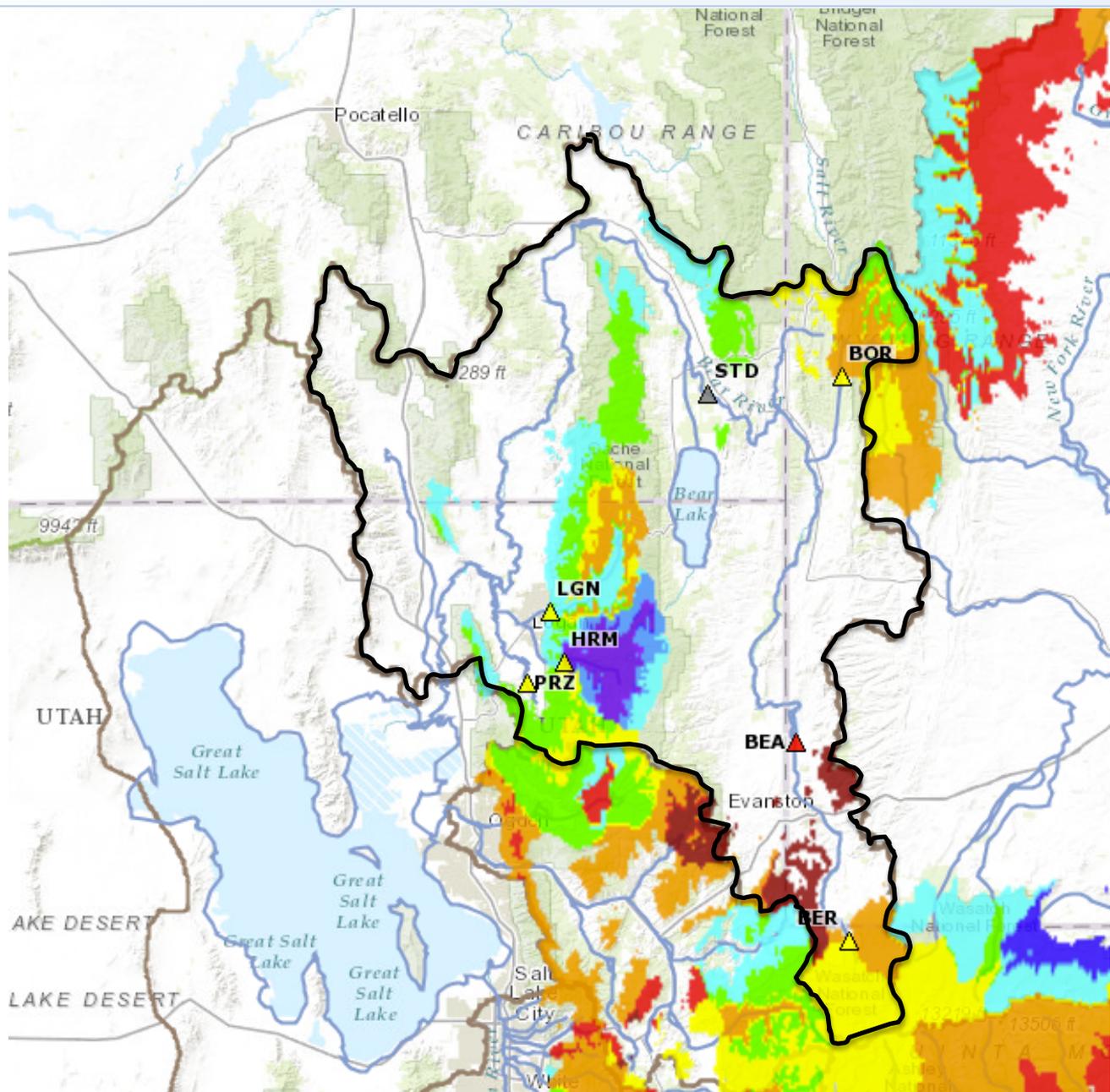
# Model soil moisture conditions entering the winter



# Bear River Basin: April 6<sup>th</sup> SNOTEL (percent of median)



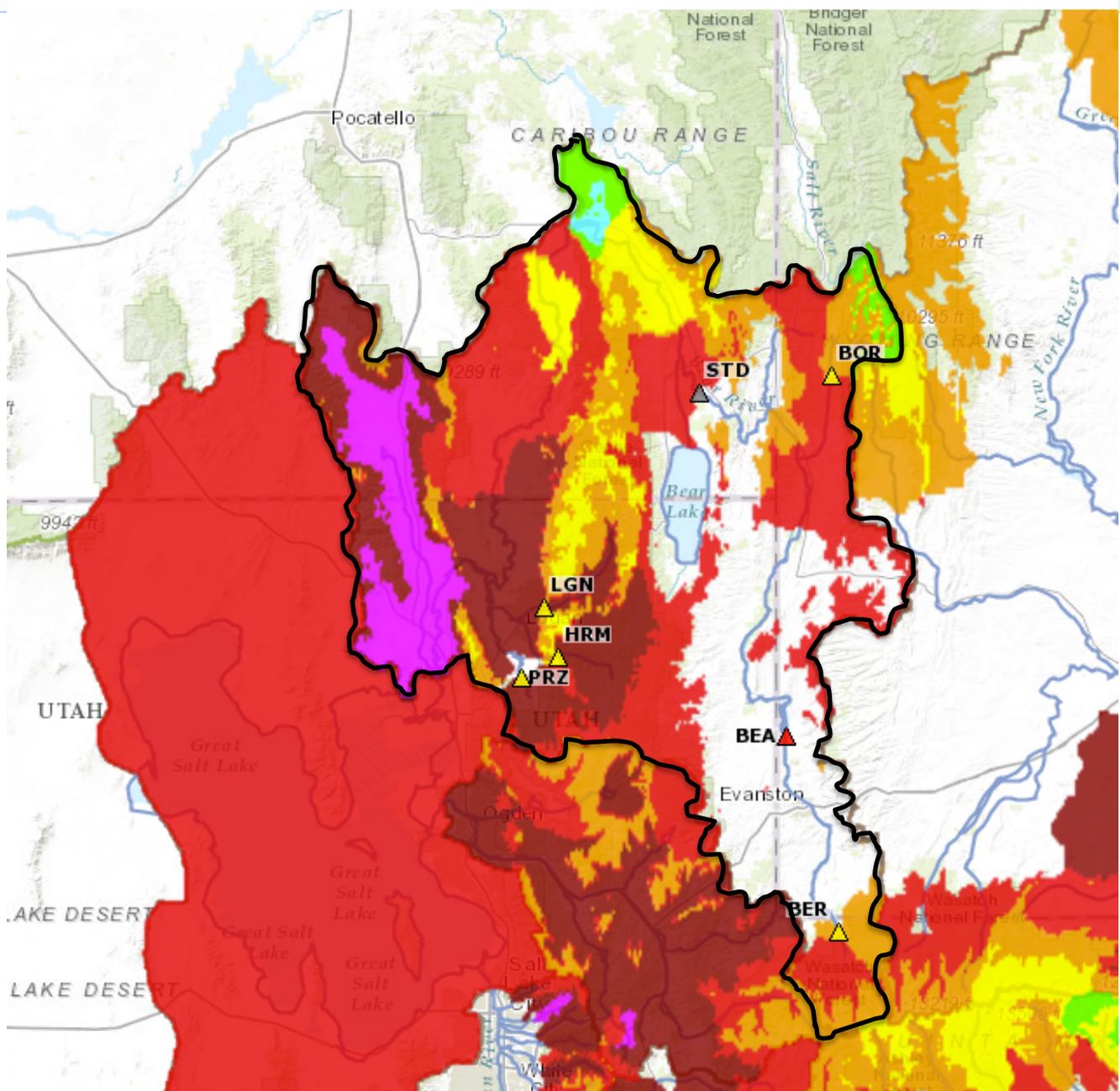
# Bear River Basin: CBRFC Model Snow – April 6th



Water supply  
forecast point  
(% average Forecast)

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

# Bear River Basin: CBRFC Model soil moisture entering winter



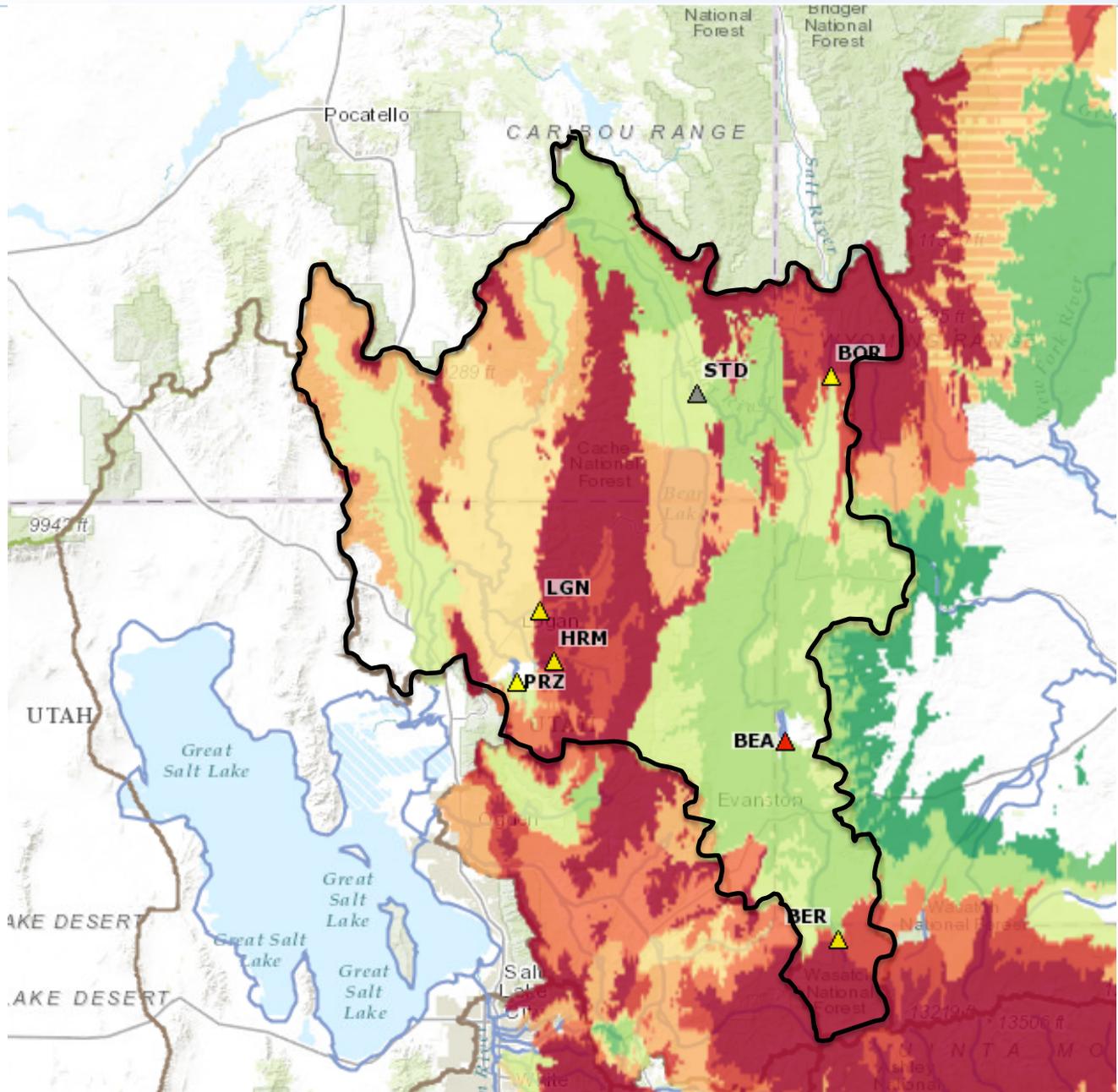
CBRFC Model Soil Moisture

% Normal	
Dark Purple	>500%
Purple	300-500%
Light Purple	200-300%
Blue	150-200%
Light Blue	130-150%
Cyan	110-130%
Light Green	100-110%
Yellow	90-100%
Orange	70-90%
Red	50-70%
Dark Red	30-50%
Magenta	0-30%

Water supply forecast point  
(% average Forecast)

Red Triangle	< 70%
Yellow Triangle	70-90%
Light Green Triangle	90-110%
Cyan Triangle	110-130%
Blue Triangle	>130%
Grey Triangle	Regulated
White Triangle	No Forecast

# Bear River Basin: CBRFC Soil Saturation – April 6th



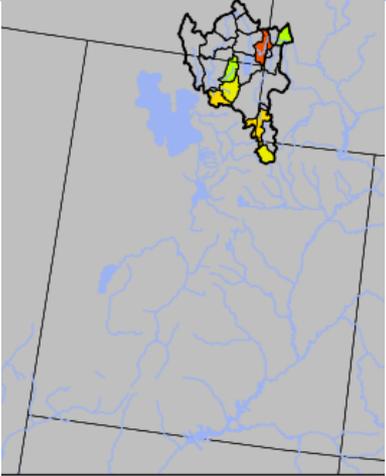
CBRFC Soil Moisture Model  
Inches to Saturation

Inches	
<span style="color: #800000;">■</span>	>12
<span style="color: #C00000;">■</span>	10-12
<span style="color: #FF4500;">■</span>	8-10
<span style="color: #FF8C00;">■</span>	6-8
<span style="color: #FFD700;">■</span>	5-6
<span style="color: #FFFF00;">■</span>	4-5
<span style="color: #90EE90;">■</span>	3-4
<span style="color: #3CB371;">■</span>	2-3
<span style="color: #008000;">■</span>	1-2
<span style="color: #006400;">■</span>	<1

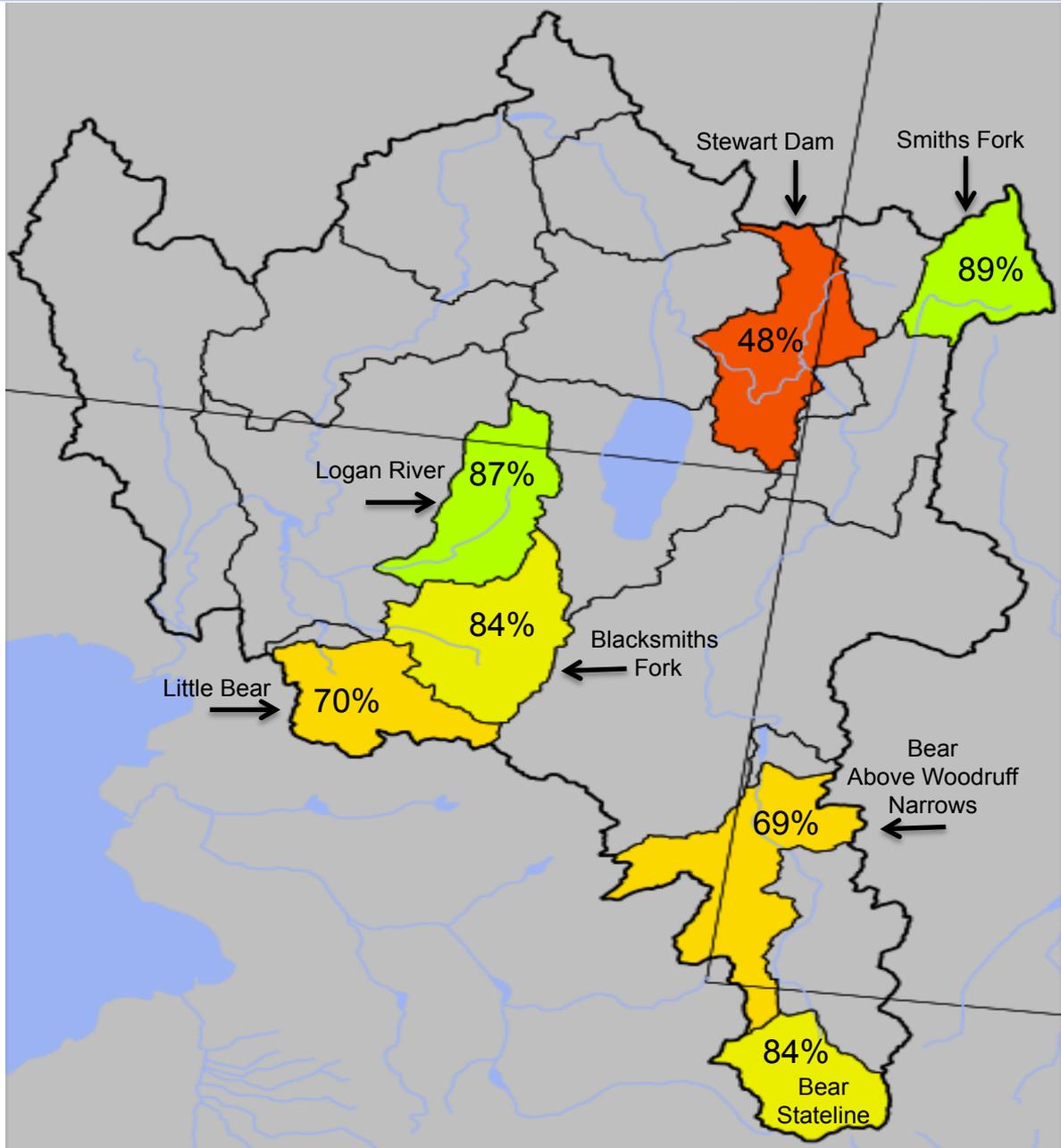
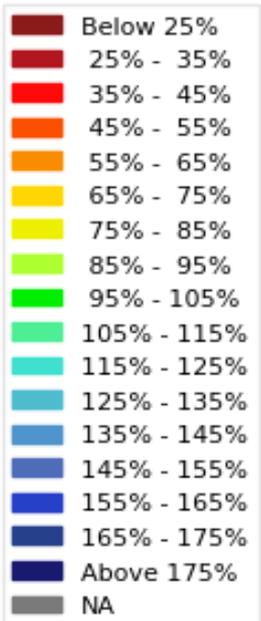
Water supply  
forecast point  
(% average Forecast)

<span style="color: #FF0000;">▲</span>	< 70%
<span style="color: #FFA500;">▲</span>	70-90%
<span style="color: #90EE90;">▲</span>	90-110%
<span style="color: #00CED1;">▲</span>	110-130%
<span style="color: #0000FF;">▲</span>	>130%
<span style="color: #808080;">▲</span>	Regulated
<span style="color: #FFFFFF;">▲</span>	No Forecast

# April 1st Water Supply Forecasts – Bear River Basin

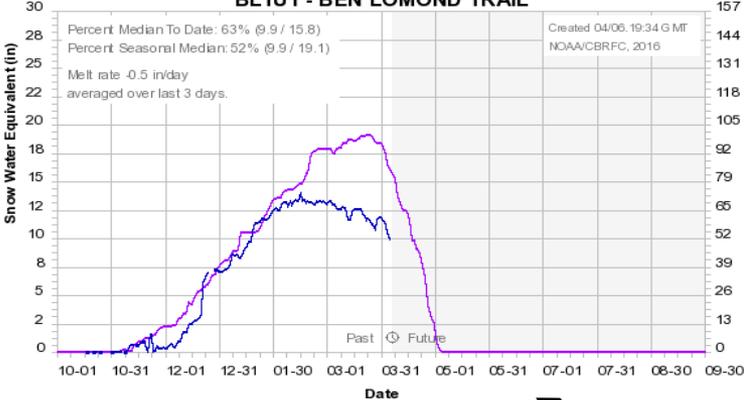


April-July Forecast  
Streamflow Volumes  
(% of 1981-2010 average)

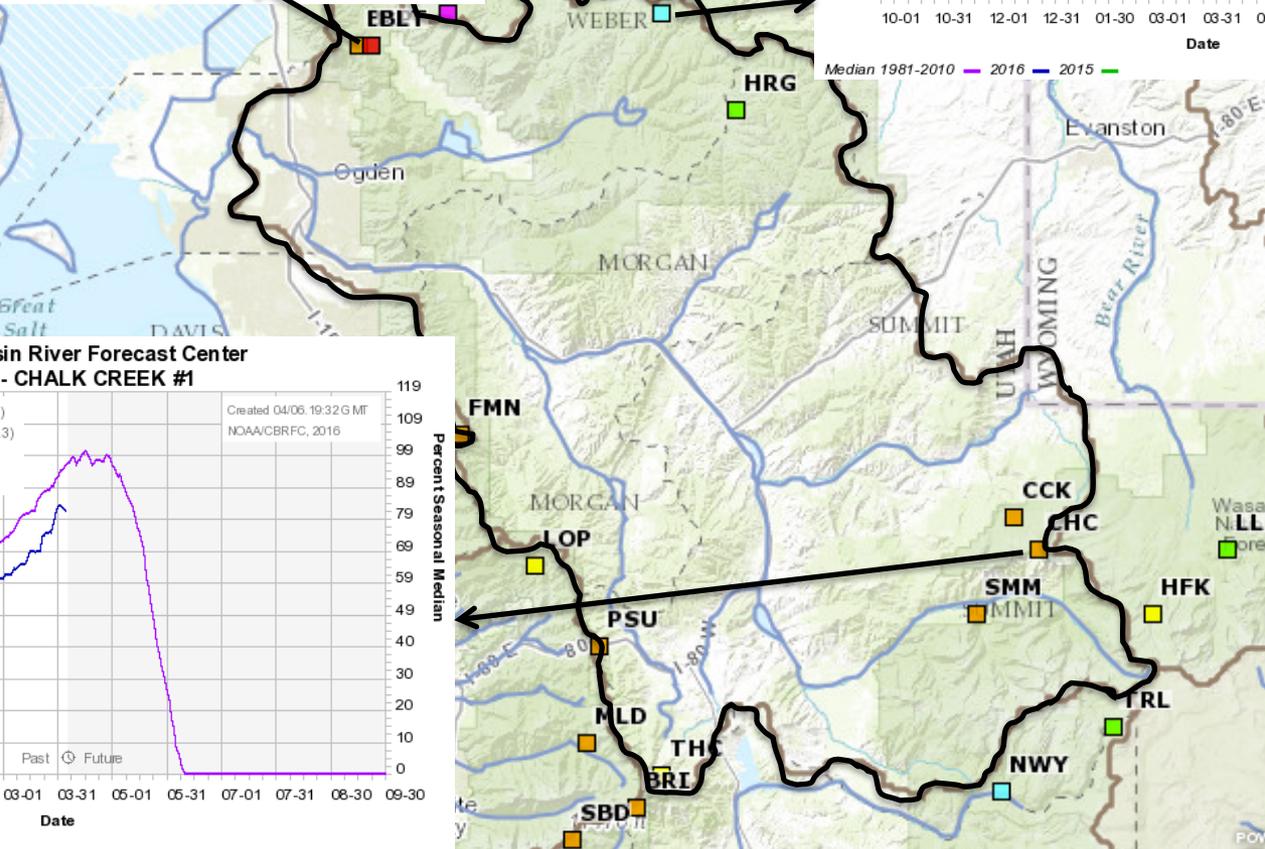
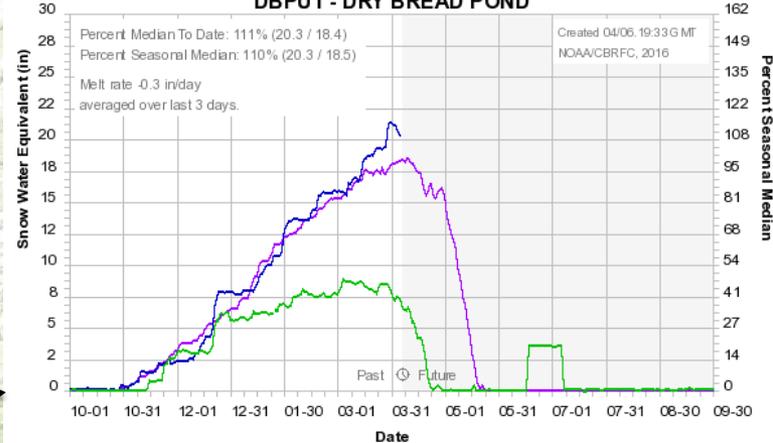


# Weber River Basin: April 6th SNOTEL (percent of median)

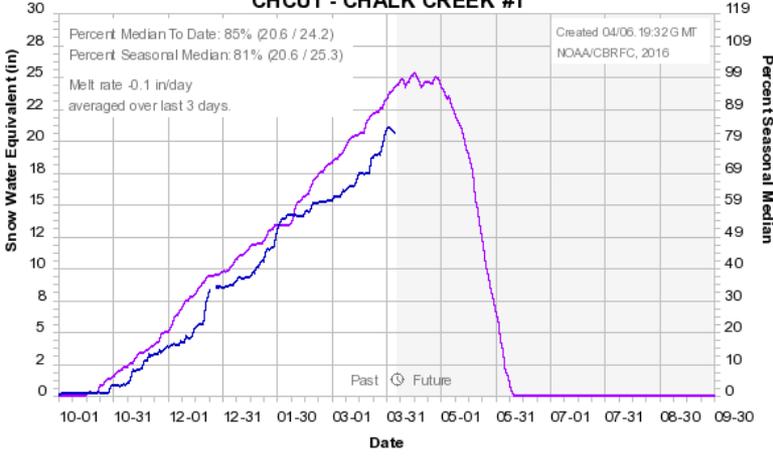
Colorado Basin River Forecast Center  
BLTU1 - BEN LOMOND TRAIL



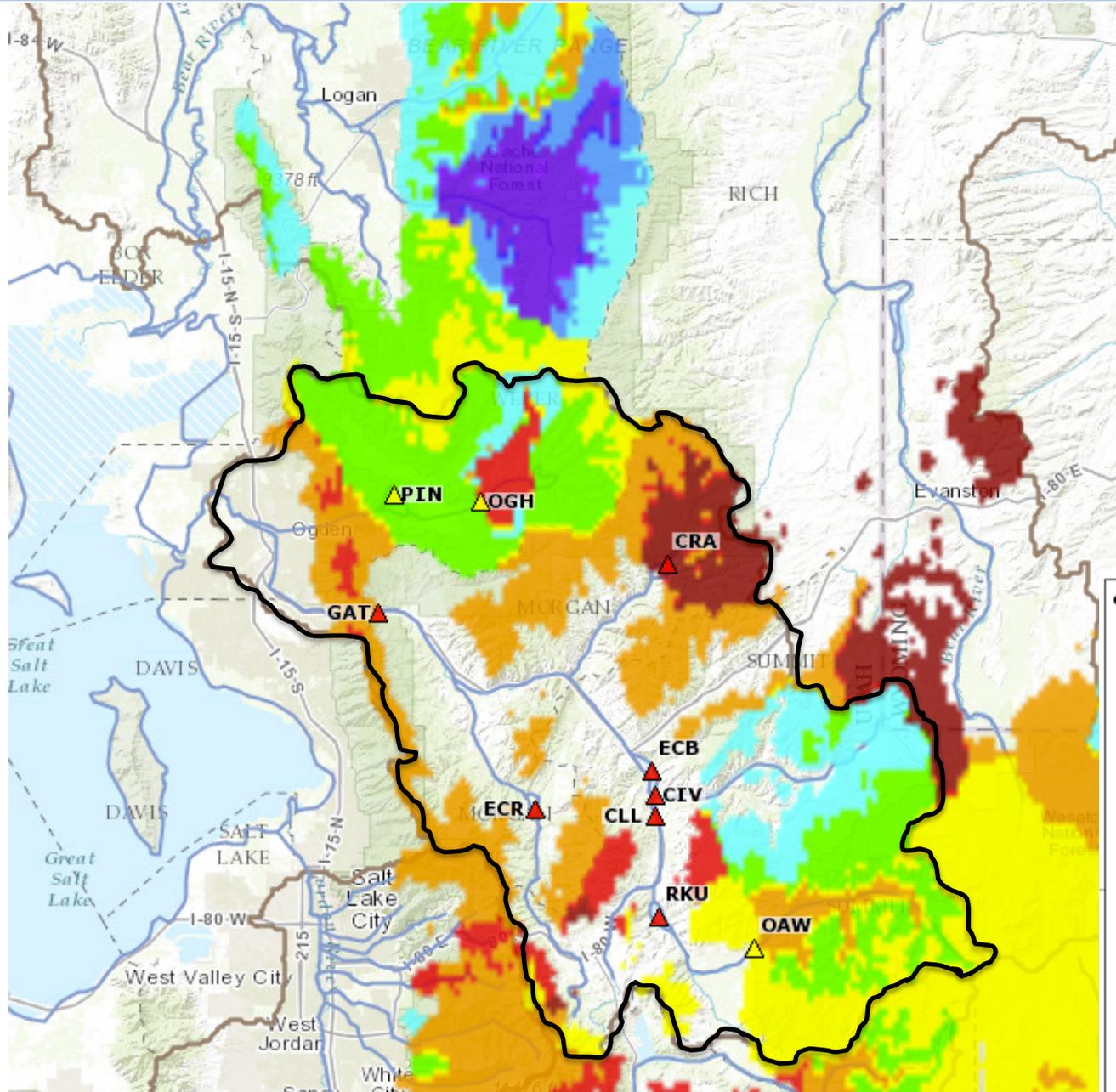
Colorado Basin River Forecast Center  
DBPU1 - DRY BREAD POND



Colorado Basin River Forecast Center  
CHCU1 - CHALK CREEK #1



# Weber River Basin: CBRFC Model Snow – April 6th



CBRFC Model Snow

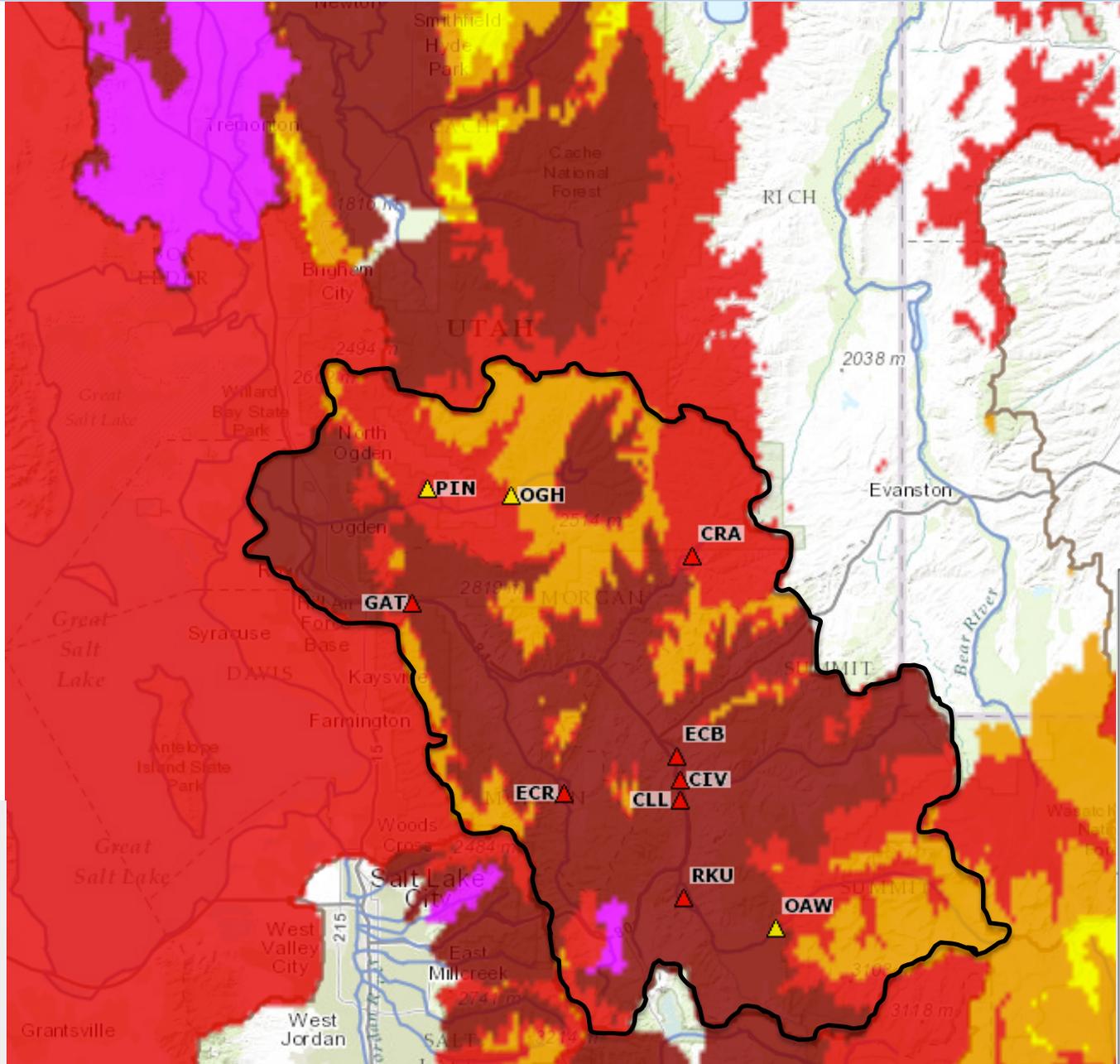
**% Median SWE**

Dark Purple	>500%
Medium Purple	300-500%
Light Purple	200-300%
Blue	150-200%
Cyan	130-150%
Light Green	110-130%
Green	100-110%
Yellow	90-100%
Orange	70-90%
Red	50-70%
Dark Red	30-50%
Magenta	0-30%

Water supply forecast point  
(% average Forecast)

Red Triangle	< 70%
Yellow Triangle	70-90%
Green Triangle	90-110%
Cyan Triangle	110-130%
Blue Triangle	>130%
Grey Triangle	Regulated
White Triangle	No Forecast

# Weber River Basin: CBRFC Model soil moisture entering winter



CBRFC Model Soil Moisture

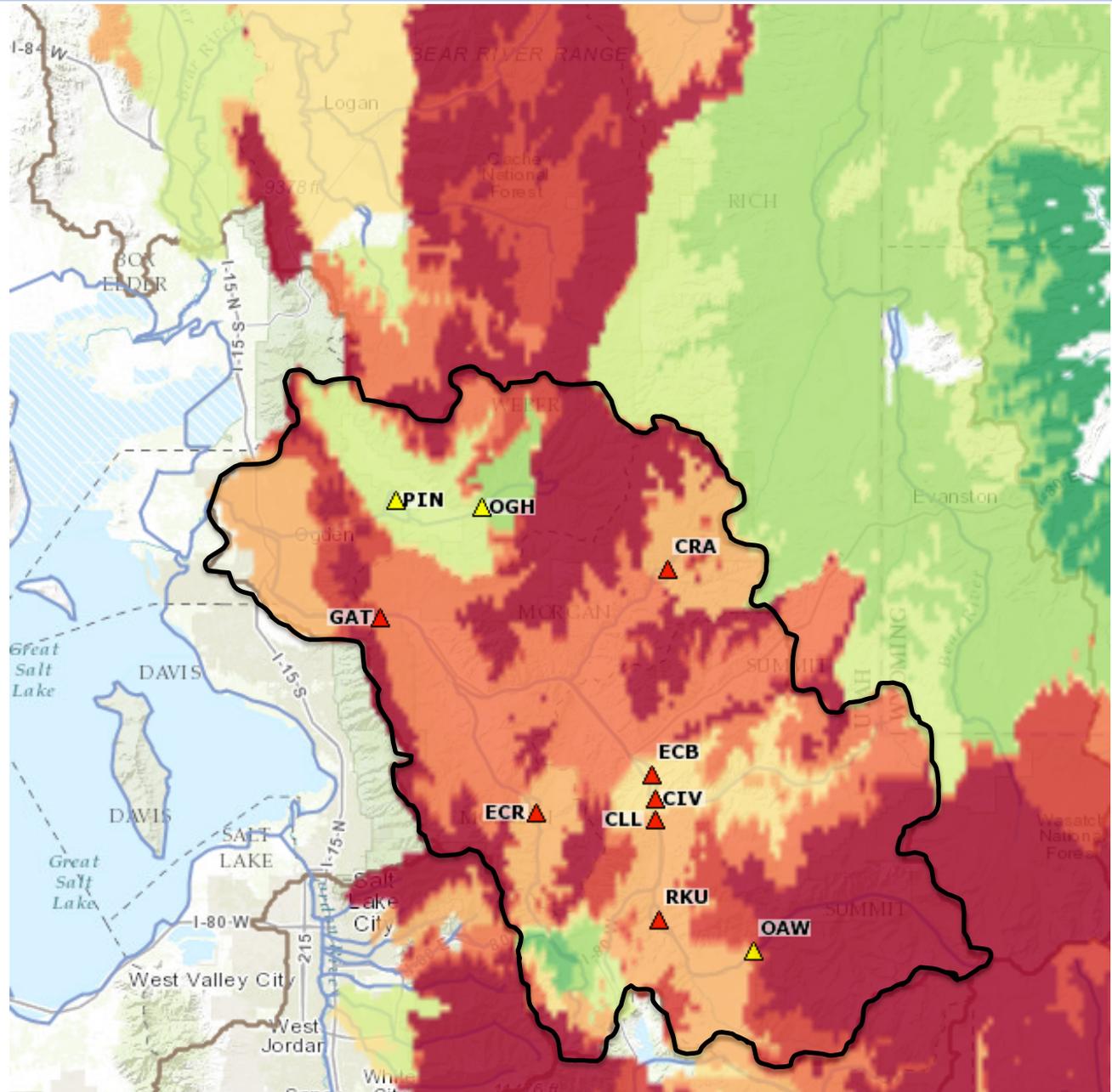
% Normal	
[Dark Purple]	>500%
[Purple]	300-500%
[Violet]	200-300%
[Blue-Violet]	150-200%
[Blue]	130-150%
[Cyan]	110-130%
[Light Green]	100-110%
[Yellow-Green]	90-100%
[Yellow]	70-90%
[Orange-Red]	50-70%
[Red]	30-50%
[Magenta]	0-30%

Water supply forecast point

(% average Forecast)

[Red Triangle]	< 70%
[Yellow Triangle]	70-90%
[Green Triangle]	90-110%
[Cyan Triangle]	110-130%
[Blue Triangle]	>130%
[Grey Triangle]	Regulated
[White Triangle]	No Forecast

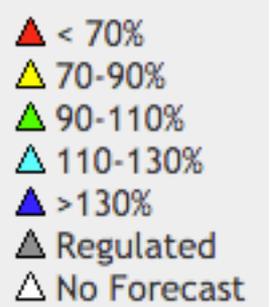
# Weber River Basin: CBRFC Soil Saturation – April 6th



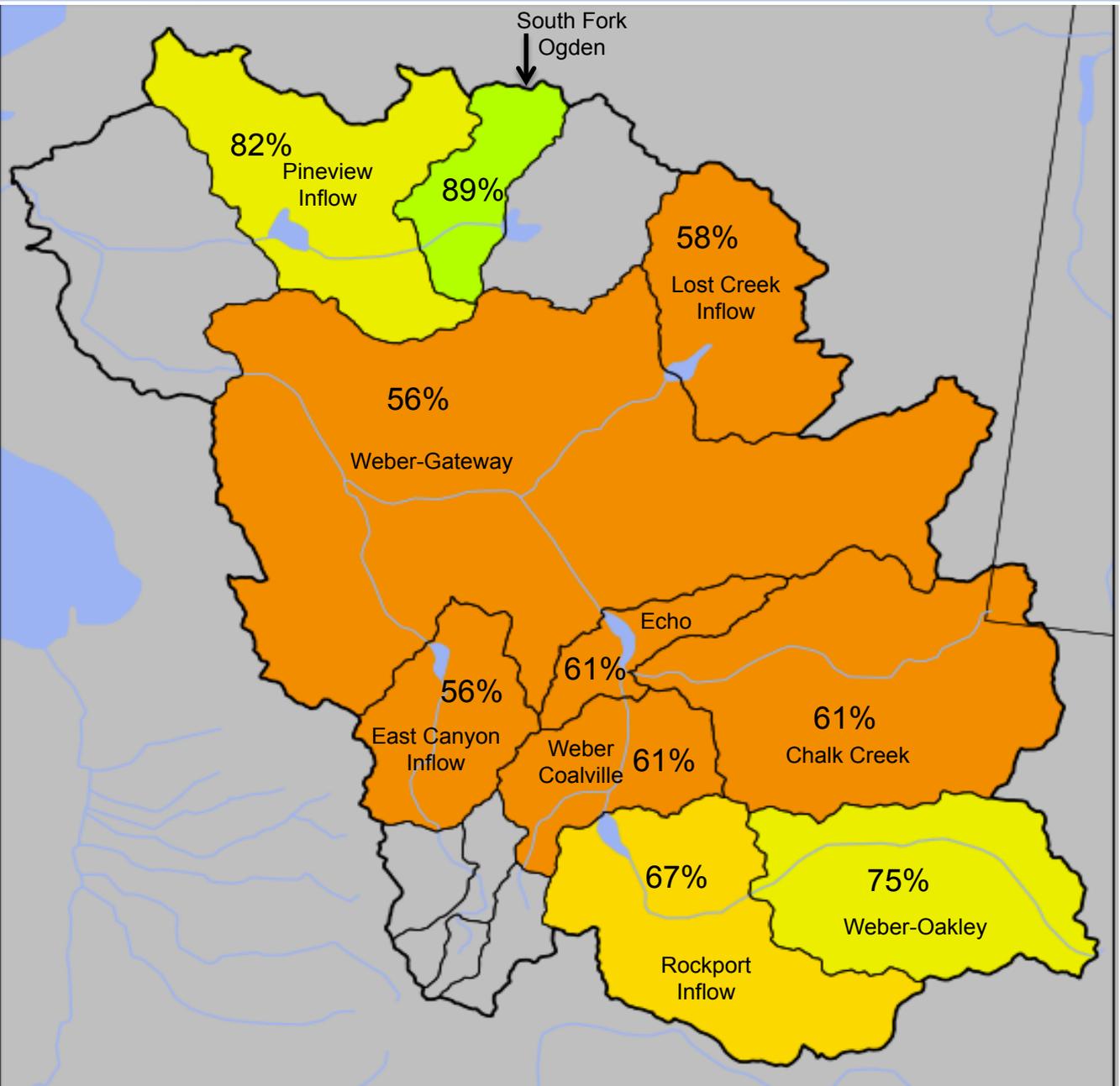
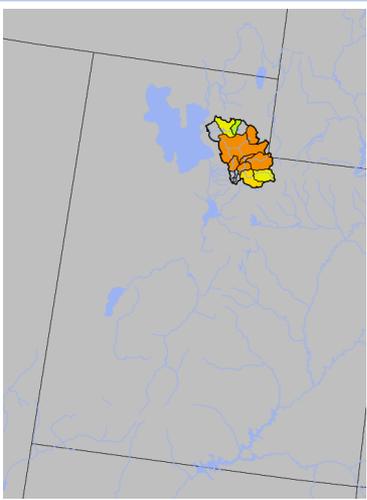
CBRFC Soil Moisture Model  
Inches to Saturation



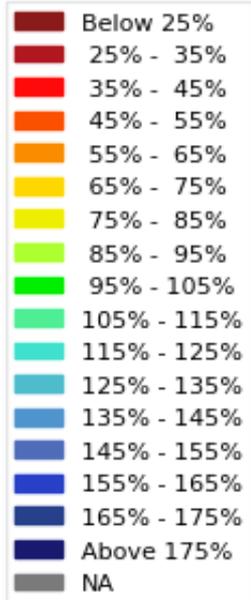
Water supply  
forecast point  
(% average Forecast)



# April 1<sup>st</sup> Water Supply Forecasts – Weber River Basin

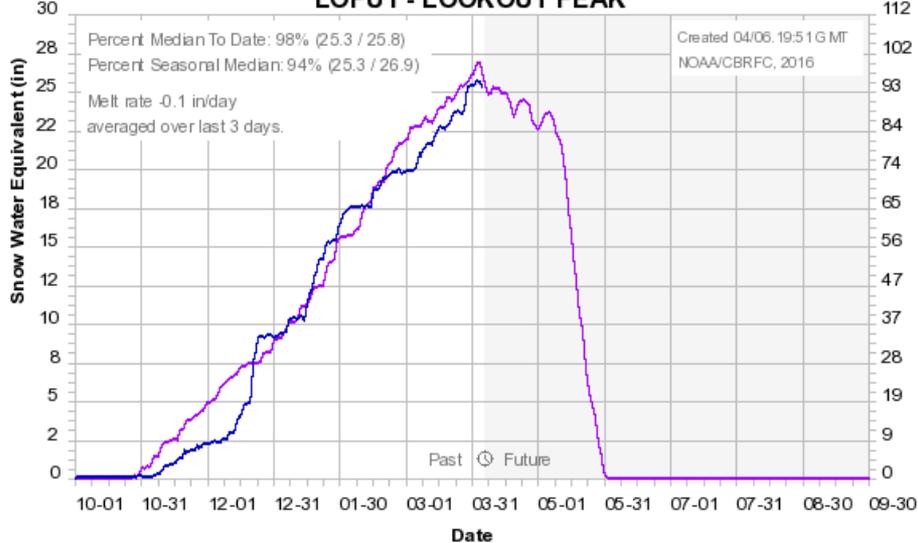


April-July Forecast Streamflow Volumes (% of 1981-2010 average)

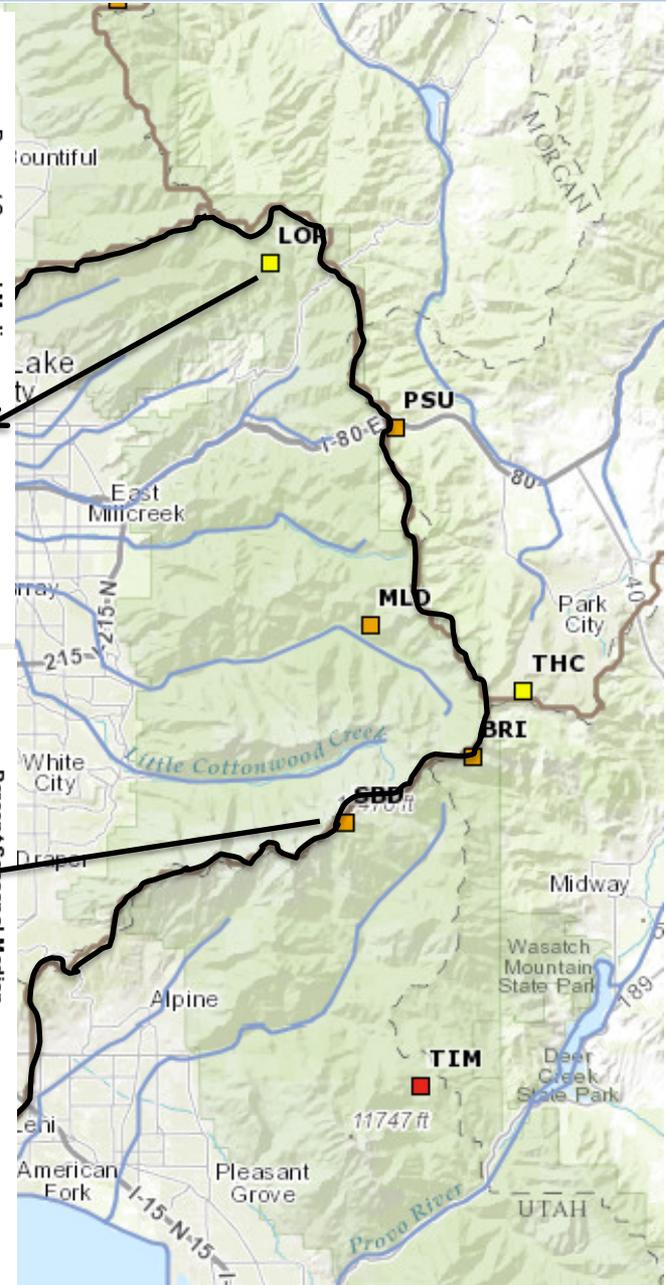
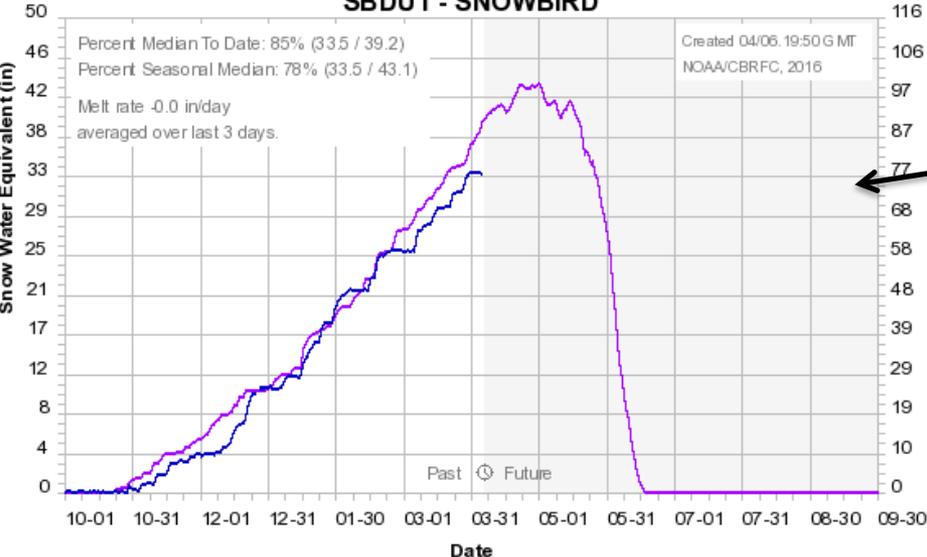


# Six Creeks: April 6<sup>th</sup> SNOTEL (percent of median)

Colorado Basin River Forecast Center  
LOPU1 - LOOKOUT PEAK



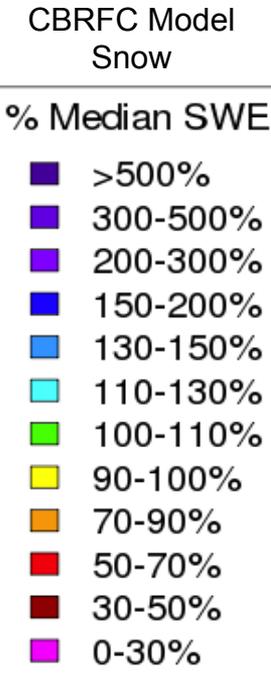
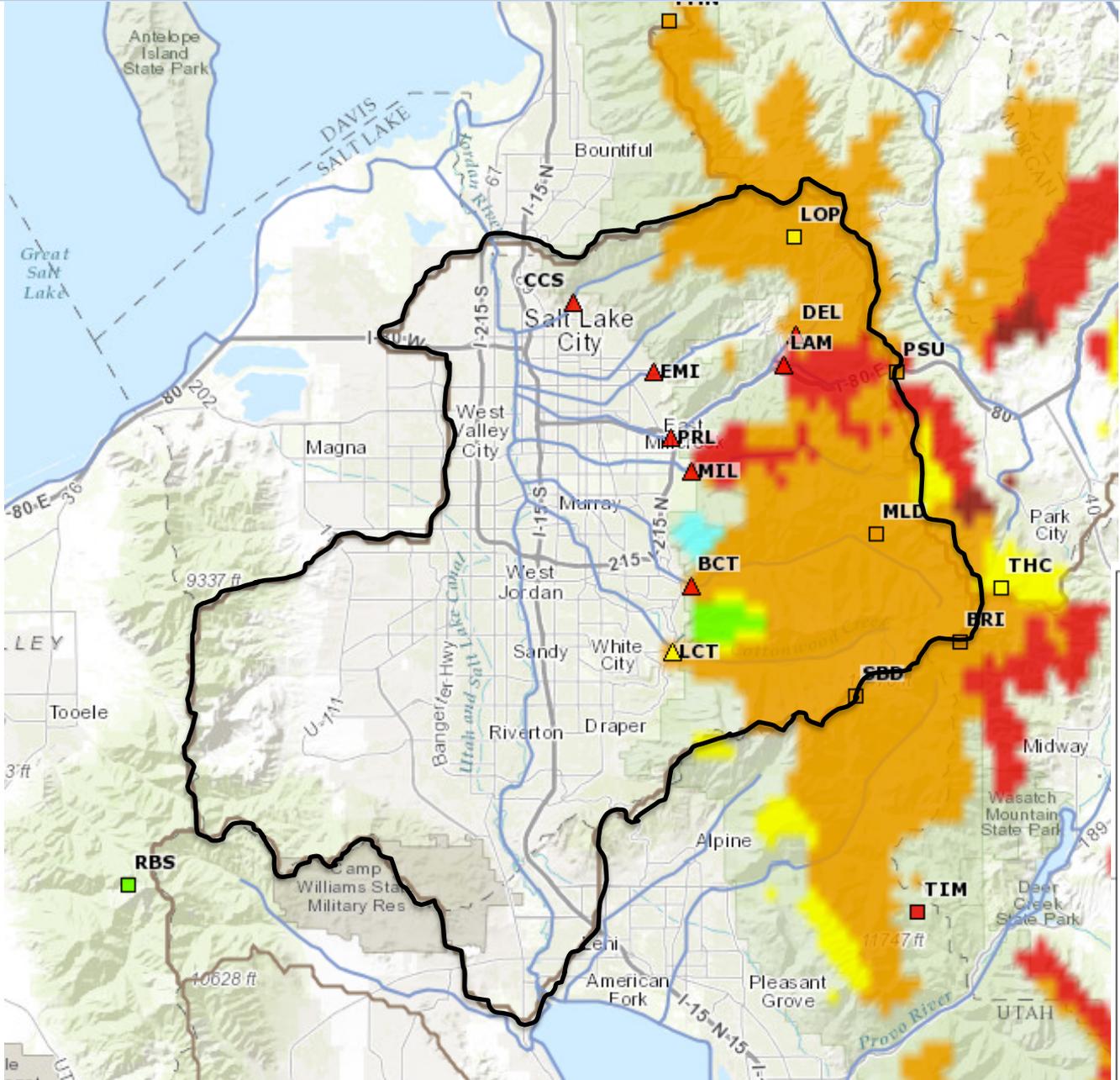
Colorado Basin River Forecast Center  
SBDU1 - SNOWBIRD



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%

# Six Creeks: CBRFC Model Snow – April 6th



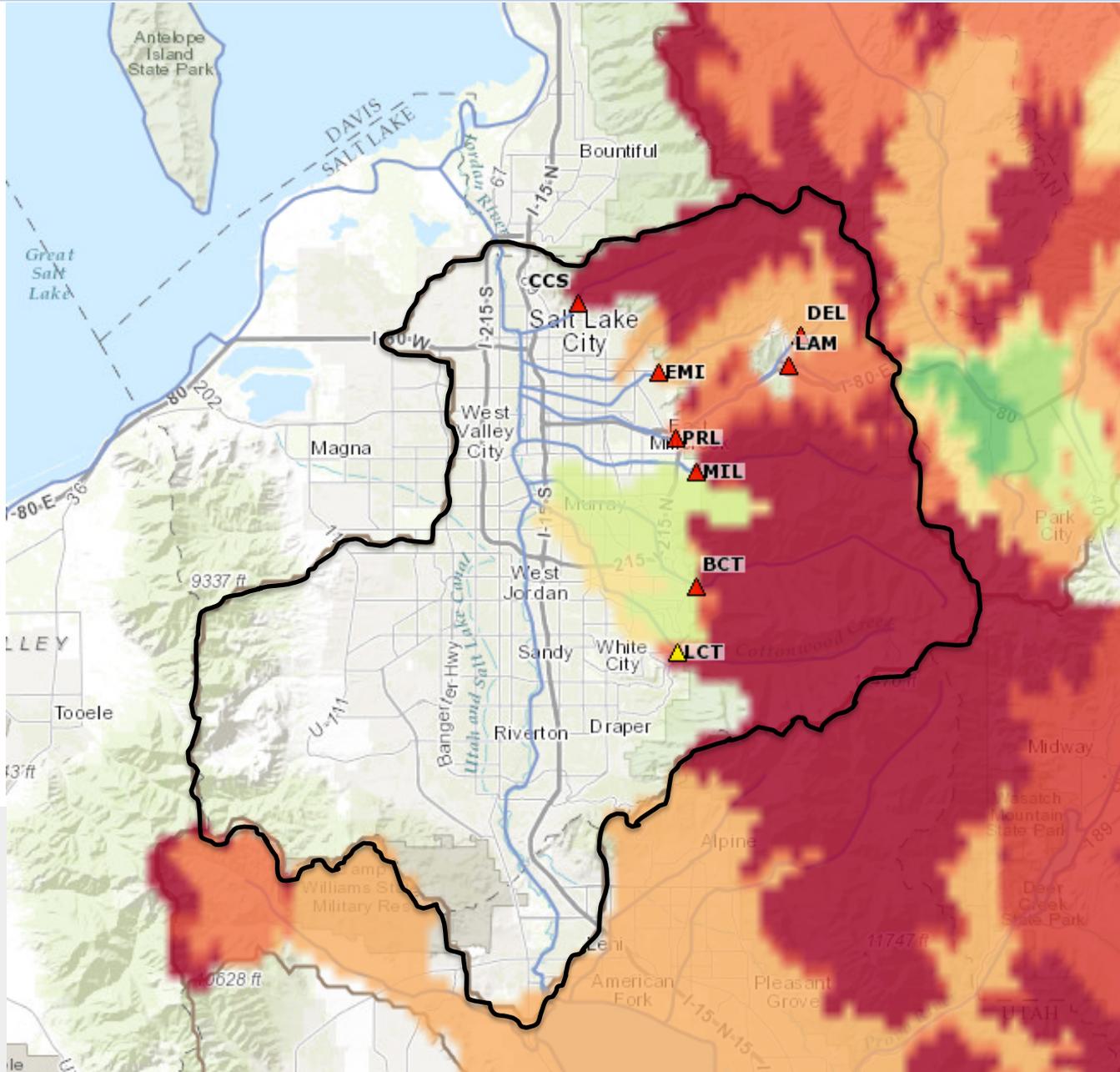
Water supply forecast point

(% average Forecast)

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



# Six Creeks: CBRFC Soil Saturation – April 6th



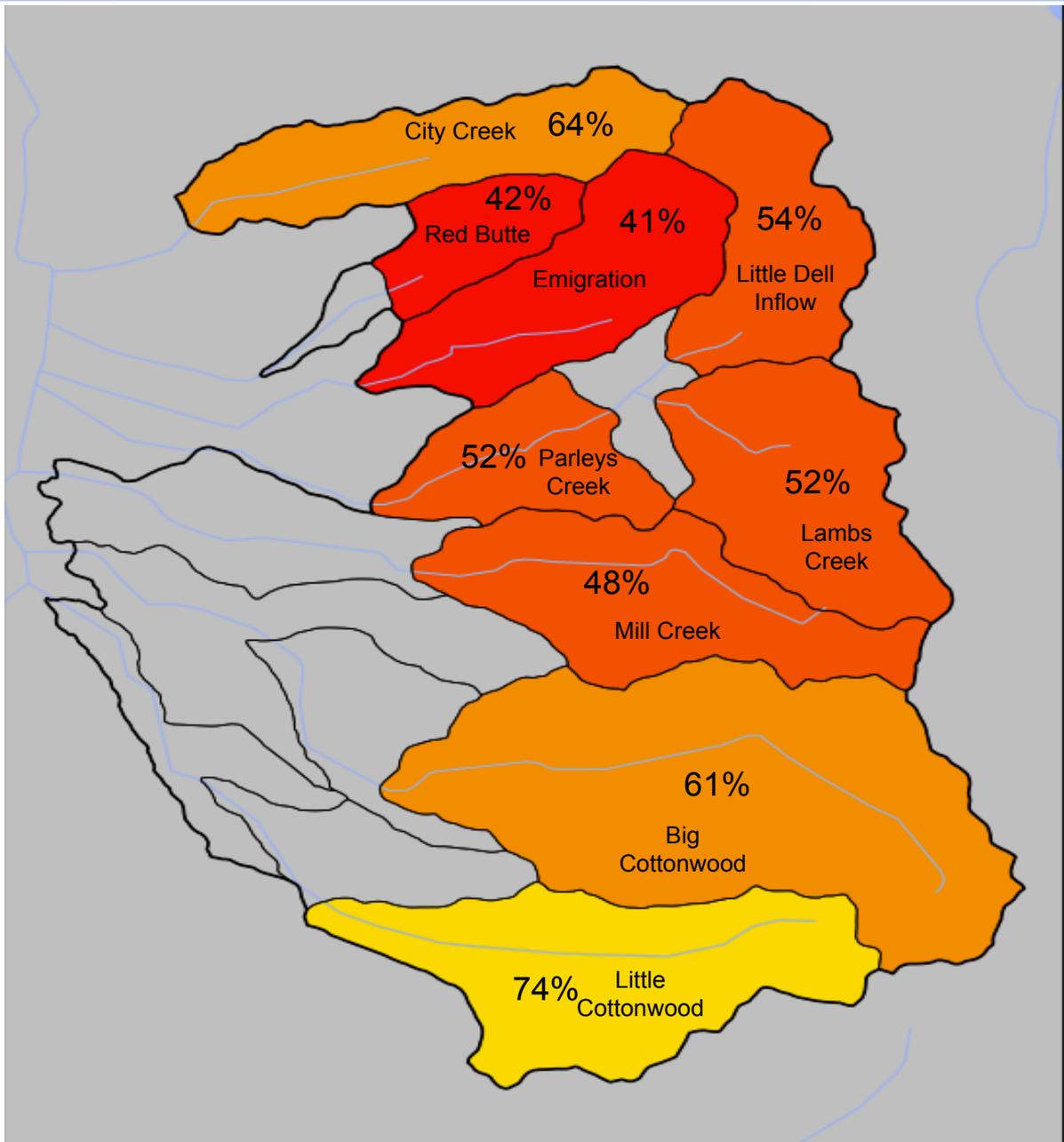
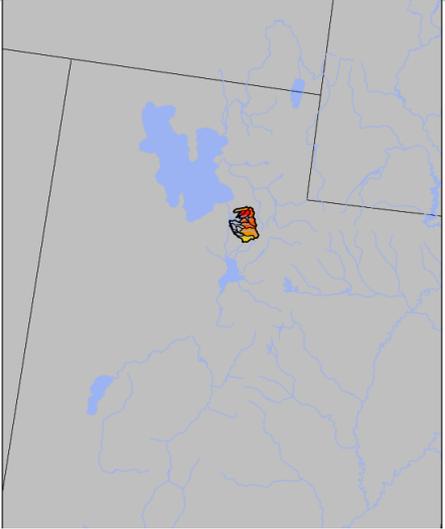
CBRFC Soil Moisture Model  
Inches to Saturation



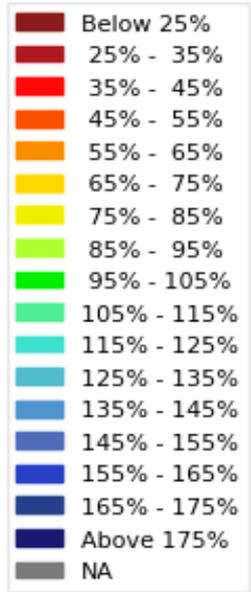
Water supply  
forecast point  
(% average Forecast)

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

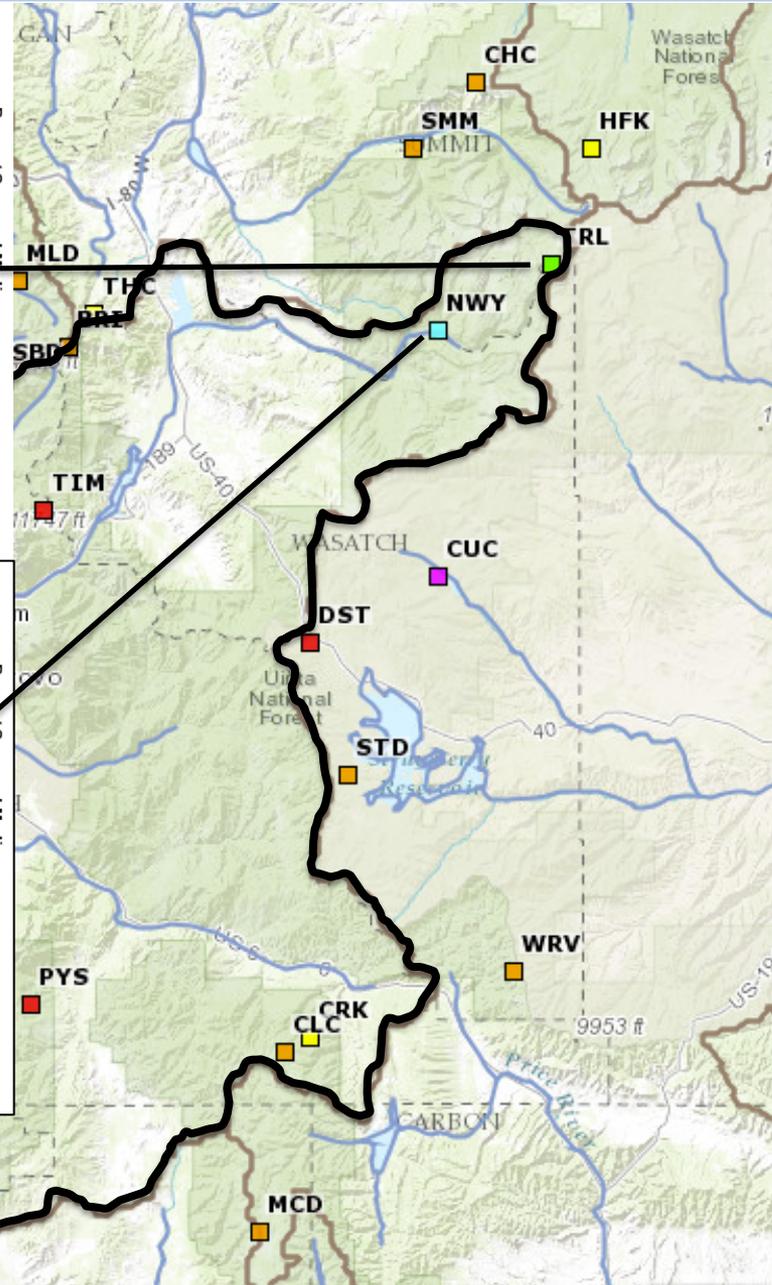
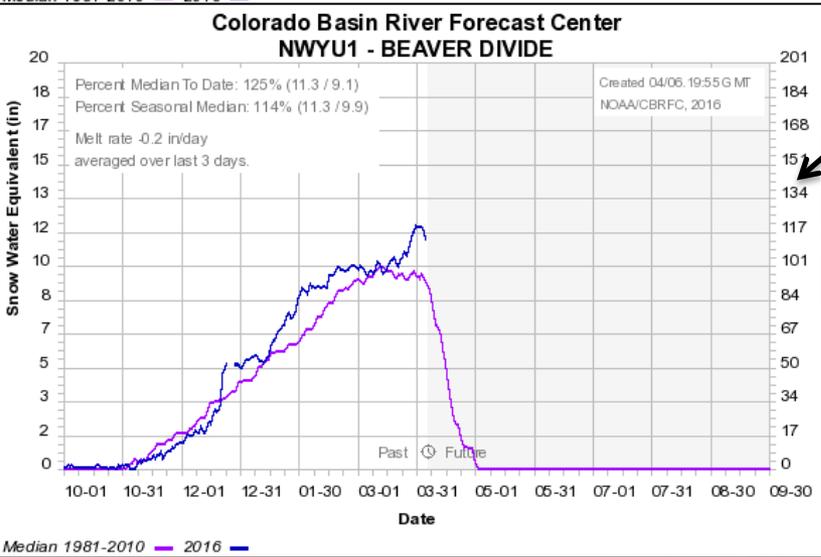
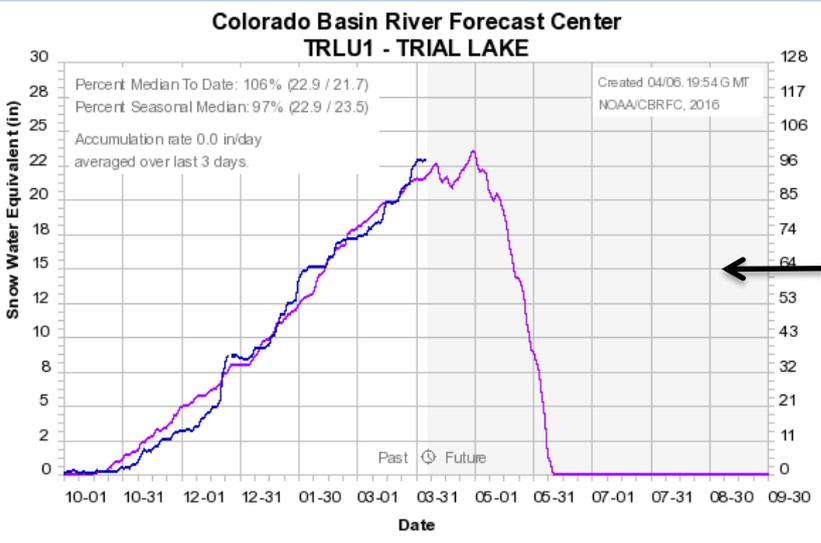
# April 1st Water Supply Forecasts – Six Creeks



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



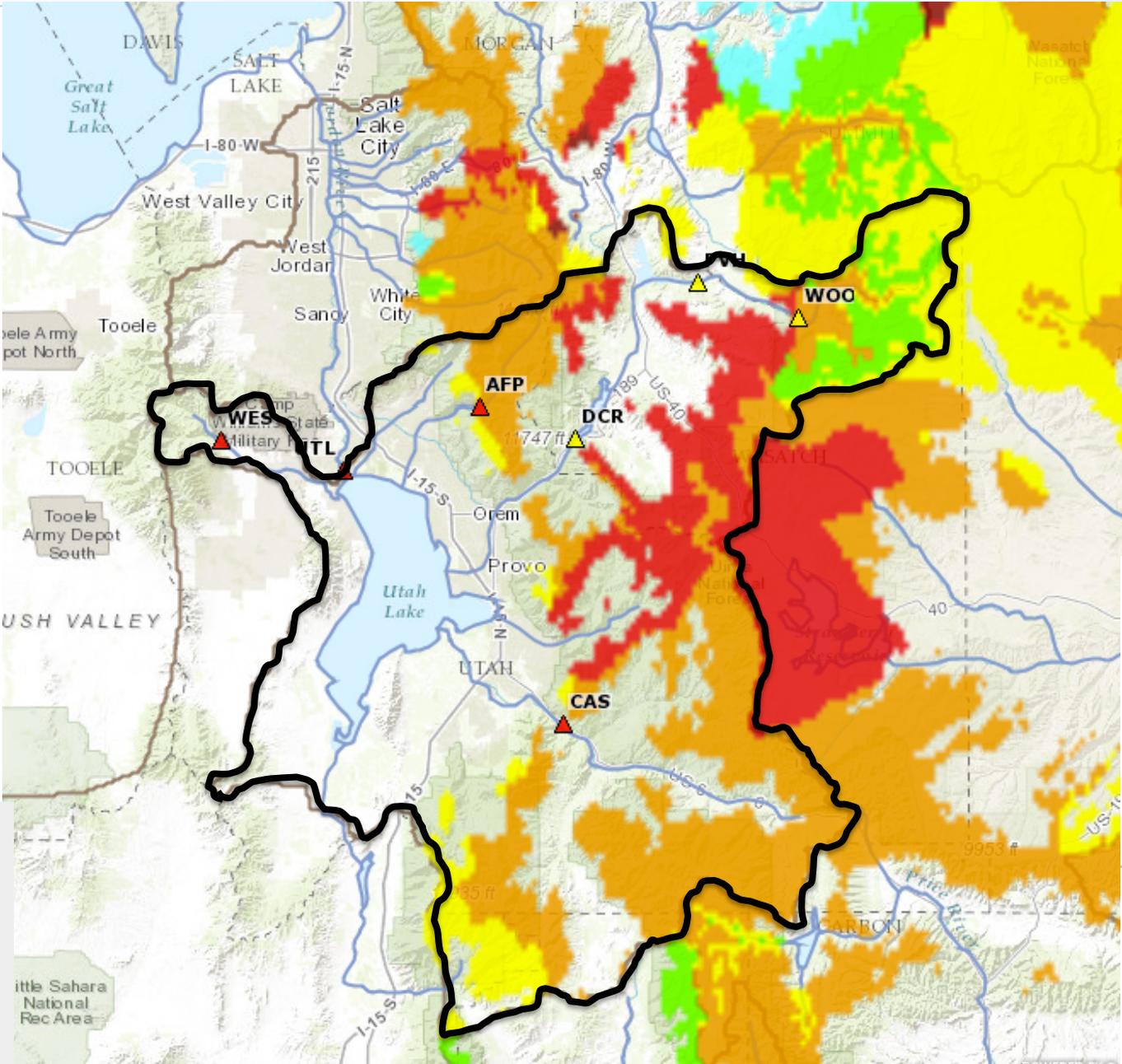
# Provo River / UT Lake: April 6<sup>th</sup> SNOTEL (percent of median)



**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



CBRFC Model Snow

% Median SWE

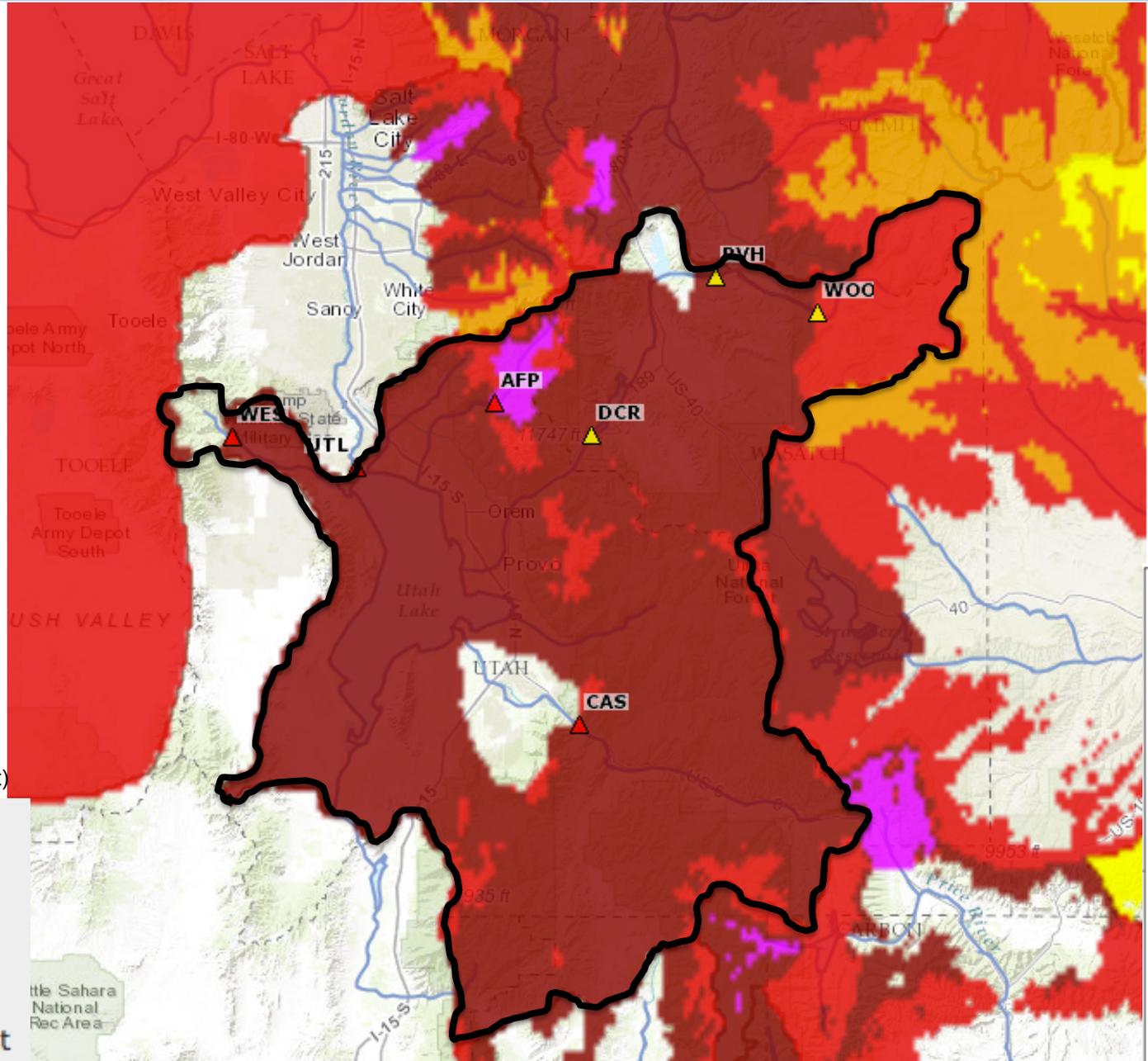
- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%

Water supply forecast point

(% average Forecast)

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

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



CBRFC Model Soil Moisture

% Normal

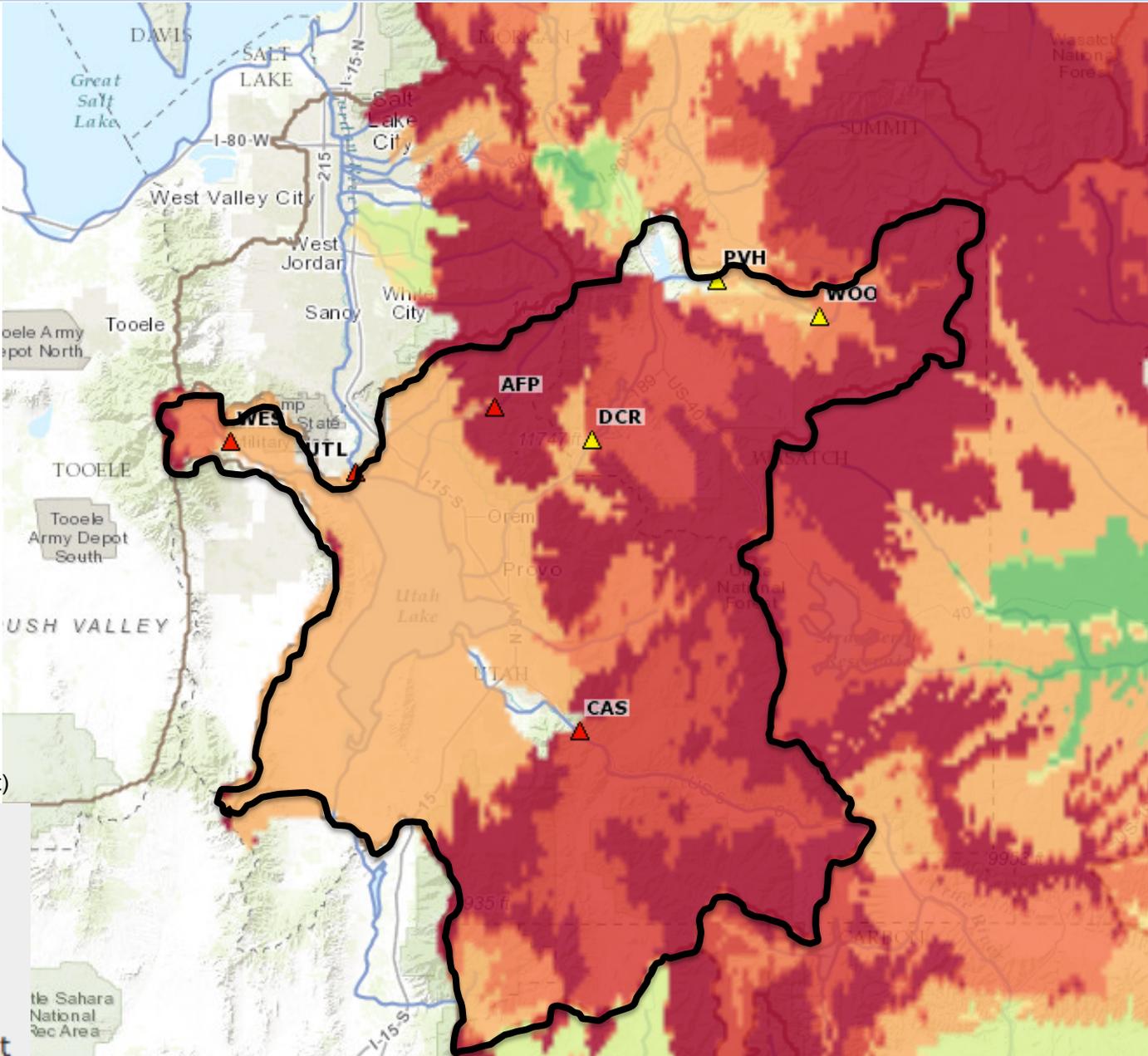
- >500%
- 300-500%
- 200-300%
- 150-200%
- 130-150%
- 110-130%
- 100-110%
- 90-100%
- 70-90%
- 50-70%
- 30-50%
- 0-30%

Water supply forecast point

(% average Forecast)

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

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



CBRFC Soil Moisture Model  
Inches to Saturation

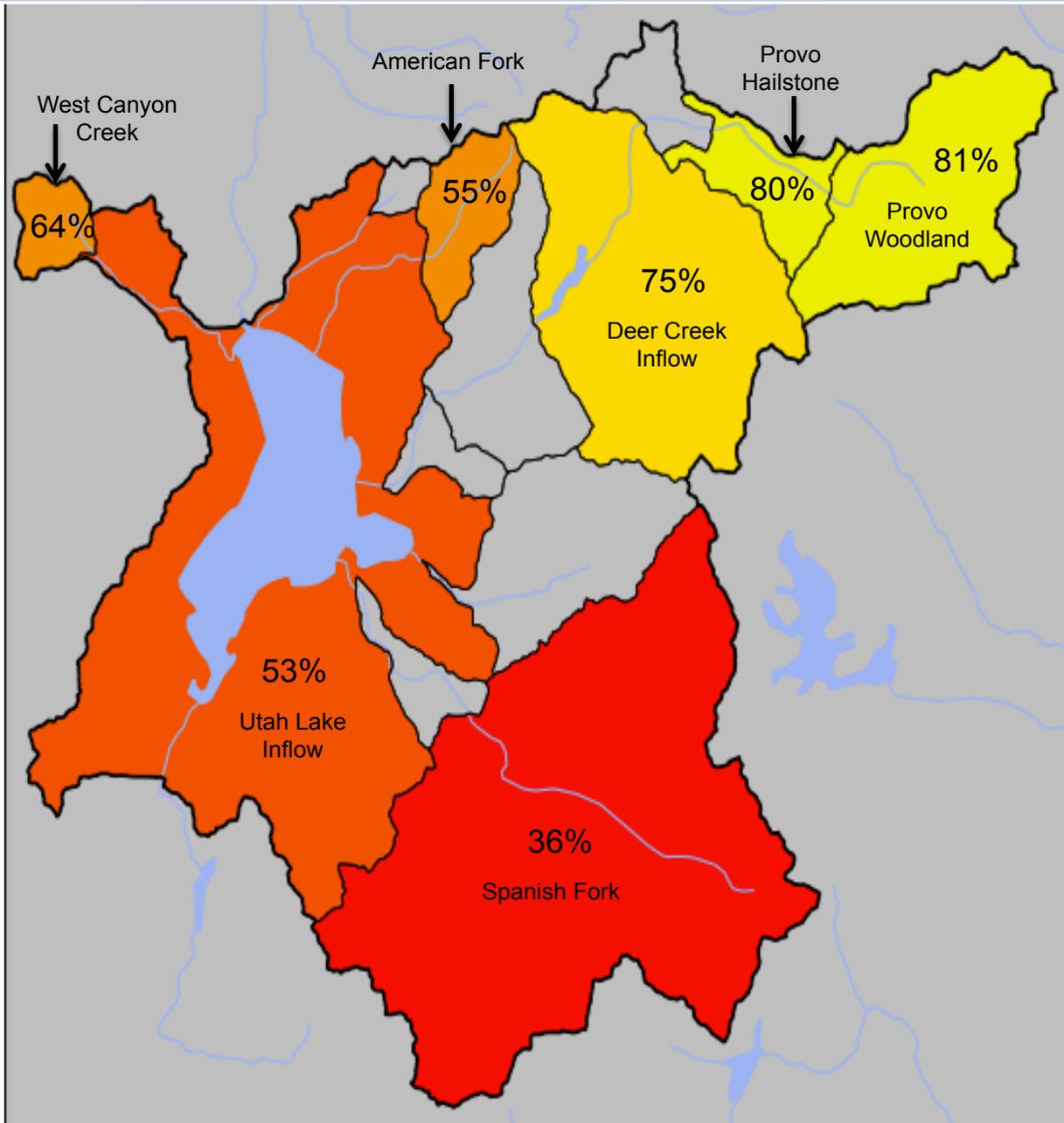
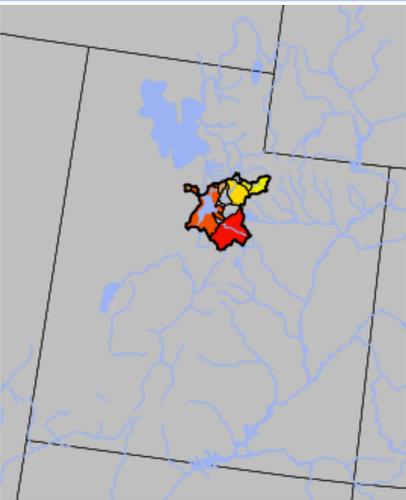
Inches	
<span style="color: #800000;">■</span>	>12
<span style="color: #C00000;">■</span>	10-12
<span style="color: #FF4500;">■</span>	8-10
<span style="color: #FF8C00;">■</span>	6-8
<span style="color: #FFD700;">■</span>	5-6
<span style="color: #9ACD32;">■</span>	4-5
<span style="color: #7CFC00;">■</span>	3-4
<span style="color: #3CB371;">■</span>	2-3
<span style="color: #008000;">■</span>	1-2
<span style="color: #006400;">■</span>	<1

Water supply forecast point

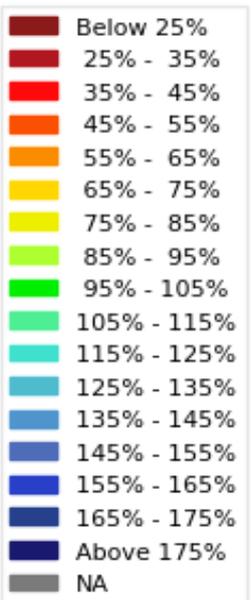
(% average Forecast)

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

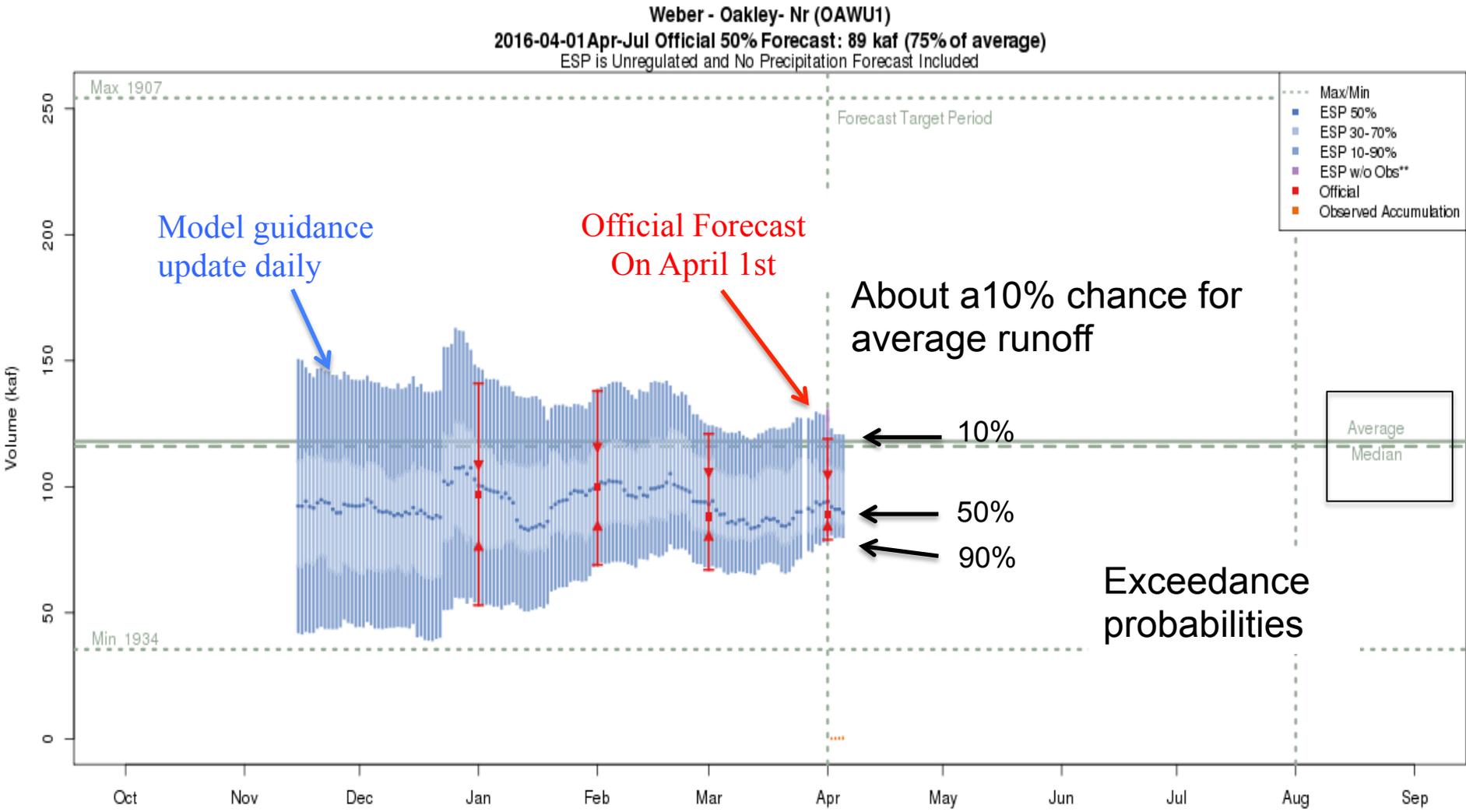
# April 1st Water Supply Forecasts – Provo River / Utah Lake



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



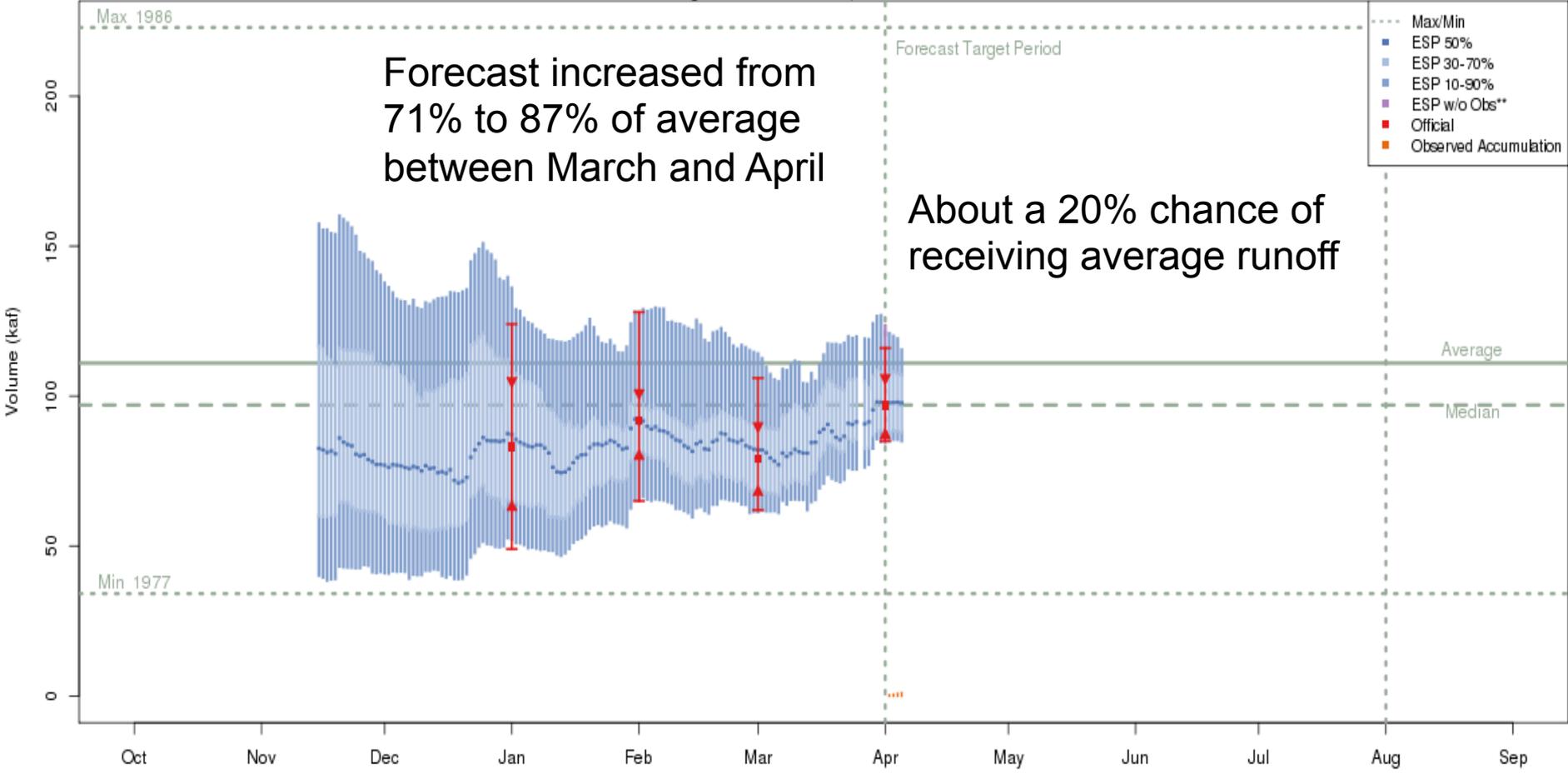
# Weber River near Oakley forecast evolution plot



The latest (2016-04-05) 50% ESP forecast is 90 kaf.  
 Plot Created 2016-04-05 17:10:03, NOAA / NWS / CBRFC  
 Forecasts in the forecast target period include observed values.

# Logan River near Logan forecast evolution plot

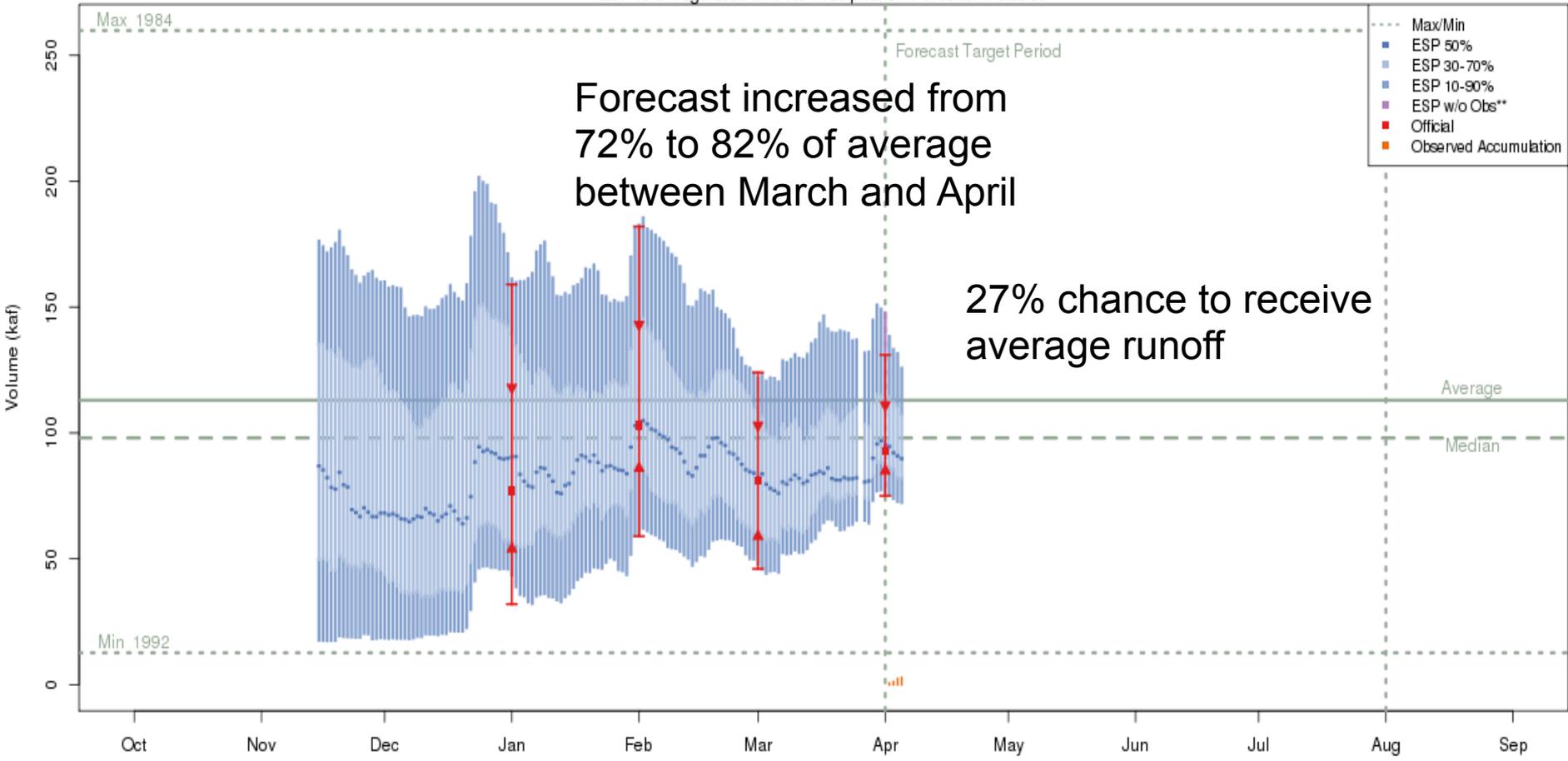
Logan - Logan- Nr- State Dam- Abv (LGNU1)  
2016-04-01 Apr-Jul Official 50% Forecast: 97 kaf (87% of average)  
ESP is Unregulated and No Precipitation Forecast Included



The latest (2016-04-05) 50% ESP forecast is 98 kaf.  
Plot Created 2016-04-05 17:05:09, NOAA / NWS / CBRFC  
Forecasts in the forecast target period include observed values.

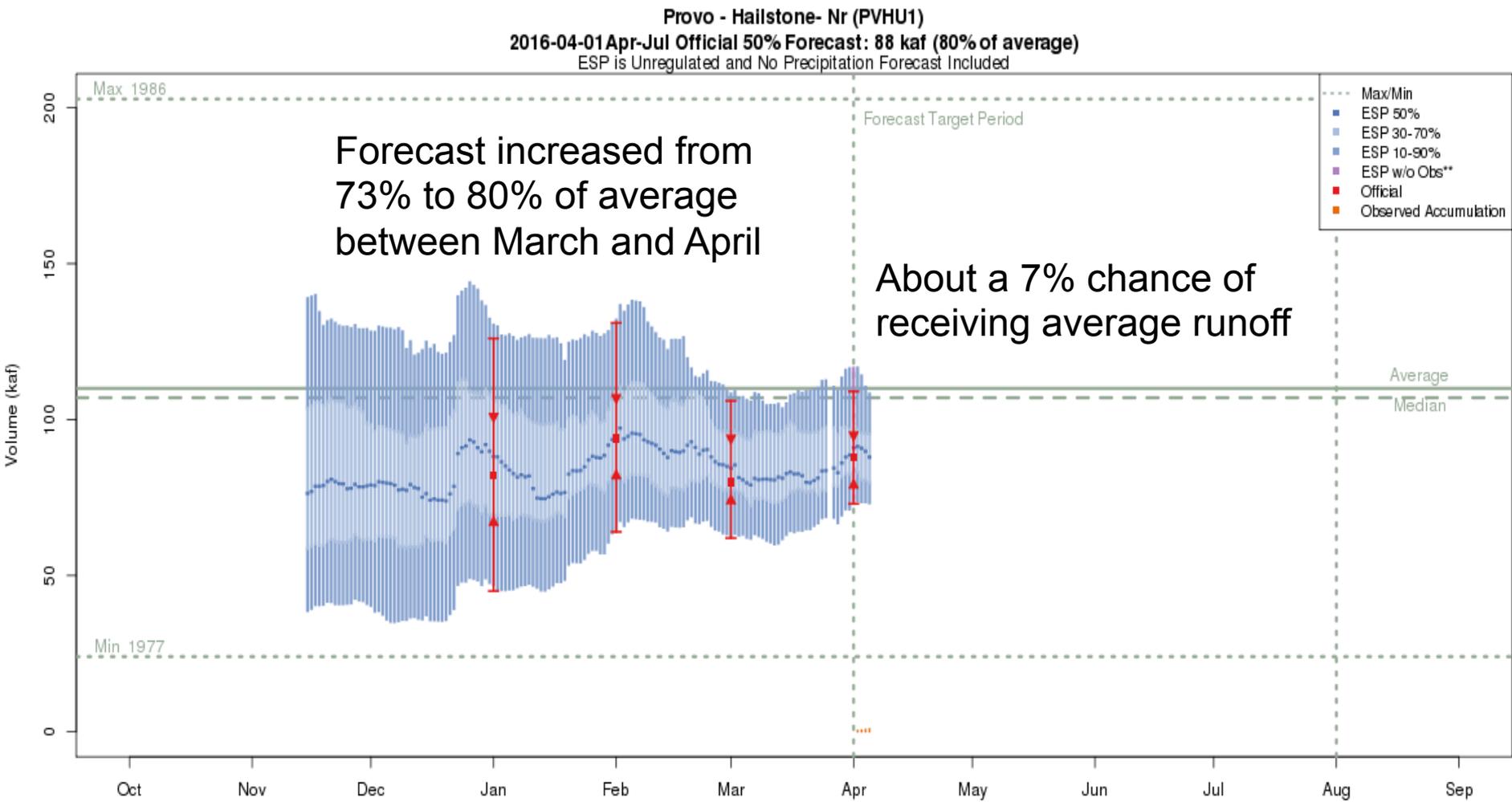
# Pineview Reservoir inflow forecast evolution plot

Ogden - Pineview Res- Ogden- Nr (PINU1)  
2016-04-01 Apr-Jul Official 50% Forecast: 93 kaf (82% of average)  
ESP is Unregulated and No Precipitation Forecast Included



The latest (2016-04-05) 50% ESP forecast is 90 kaf.  
Plot Created 2016-04-05 17:11:19, NOAA / NWS / CBRFC  
Forecasts in the forecast target period include observed values.

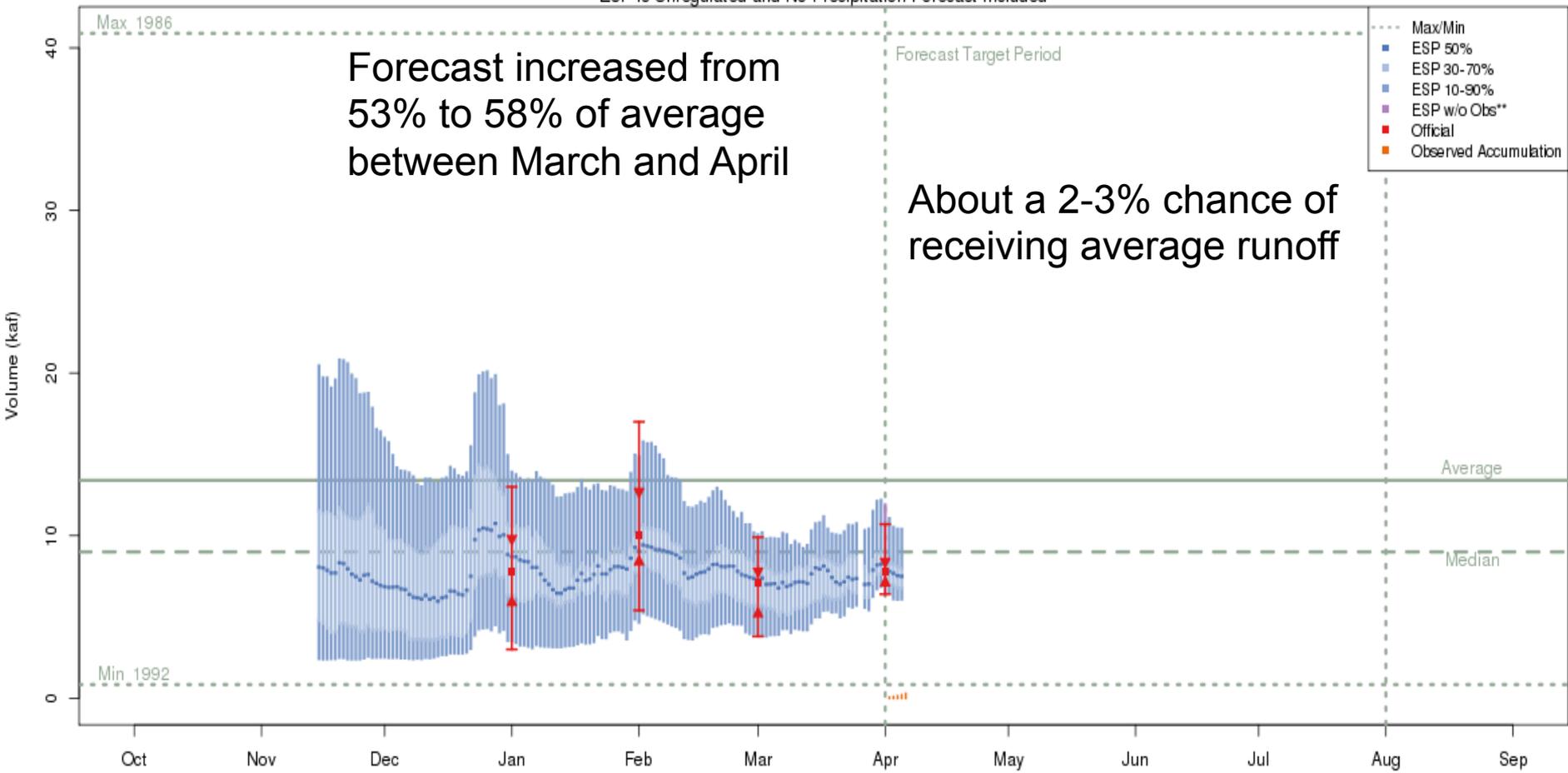
# Provo River – Hailstone forecast evolution plot



The latest (2016-04-05) 50% ESP forecast is 88 kaf.  
Plot Created 2016-04-05 17:12:48, NOAA / NWS / CBRFC  
Forecasts in the forecast target period include observed values.

# Lost Creek Inflow forecast evolution plot

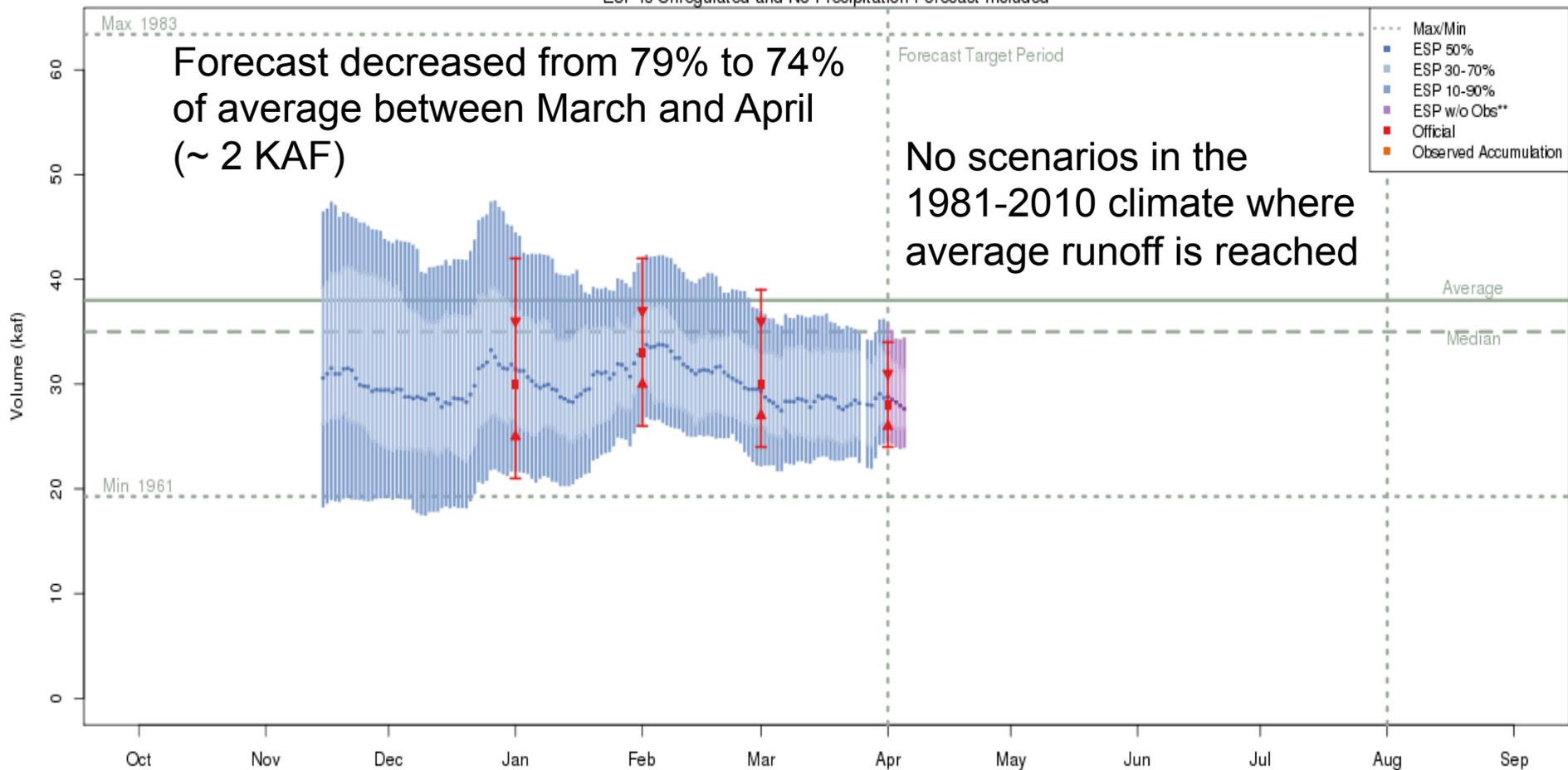
Lost Ck - Lost Ck Res- Croydon- Nr (CRAU1)  
2016-04-01 Apr-Jul Official 50% Forecast: 7.8 kaf (58% of average)  
ESP is Unregulated and No Precipitation Forecast Included



The latest (2016-04-05) 50% ESP forecast is 7 kaf.  
Plot Created 2016-04-06 14:12:59, NOAA / NWS / CBRFC  
Forecasts in the forecast target period include observed values.

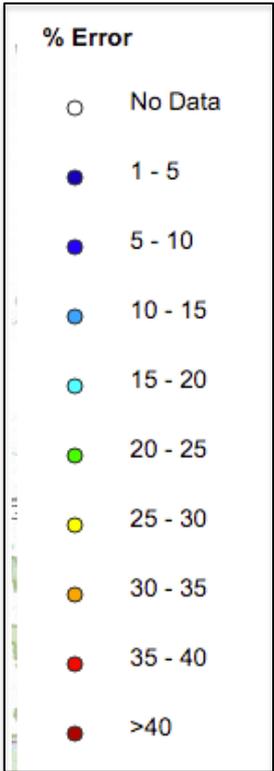
# Little Cottonwood Creek forecast evolution plot

Little Cottonwood Ck - Salt Lake City- Nr (LCTU1)  
2016-04-01 Apr-Jul Official 50% Forecast: 28 kaf (74% of average)  
ESP is Unregulated and No Precipitation Forecast Included



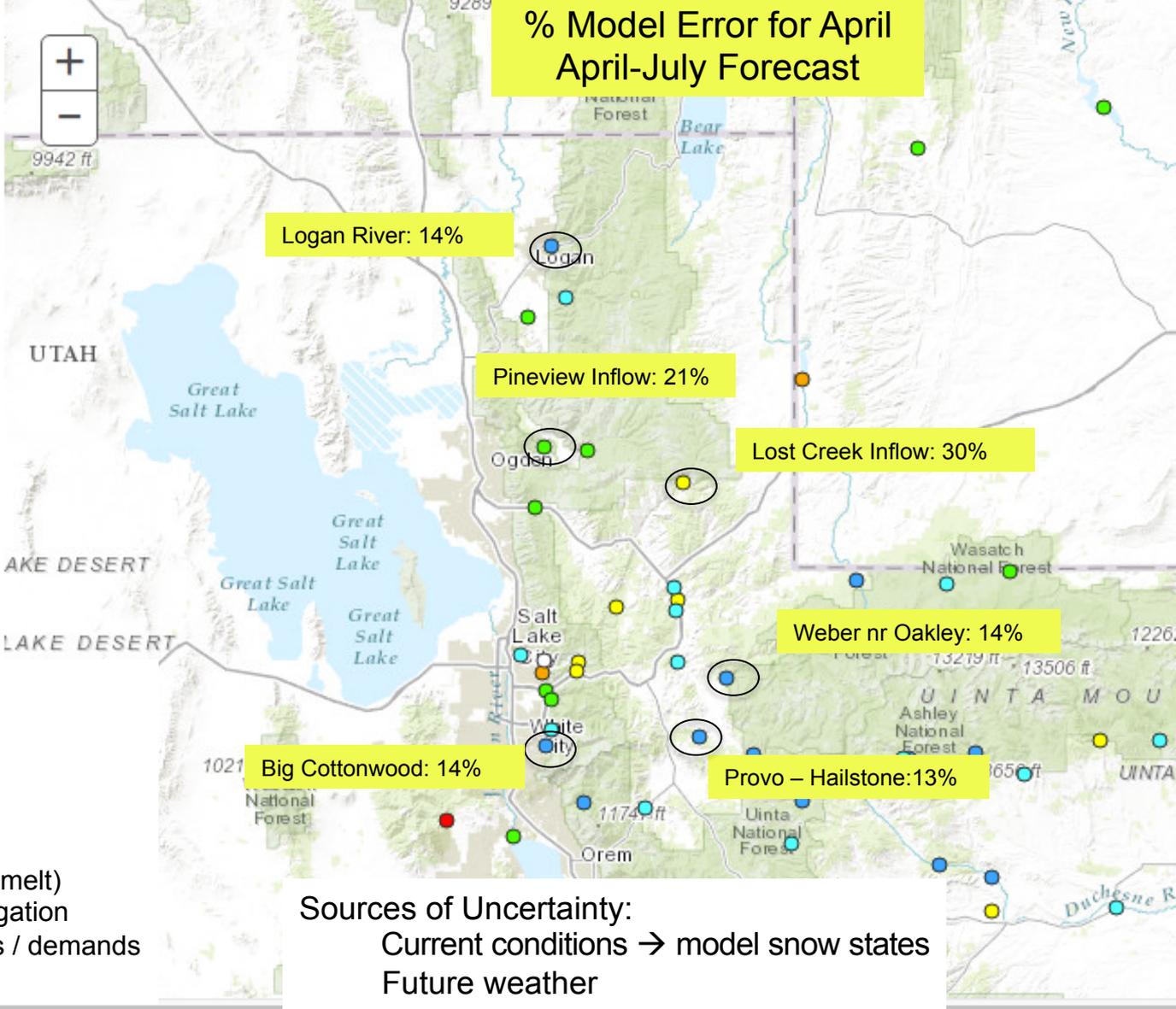
The latest (2016-03-31) 50% ESP forecast is 29 kaf.  
Plot Created 2016-04-05 17:04:10, NOAA / NWS / CBRFC  
\*\*Purple ESP forecasts do not include observed and are not total runoff.

# Forecast Accuracy ? How good are we in April ?



## Water Supply Verification - April

[Help](#) Double Click Map to Zoom

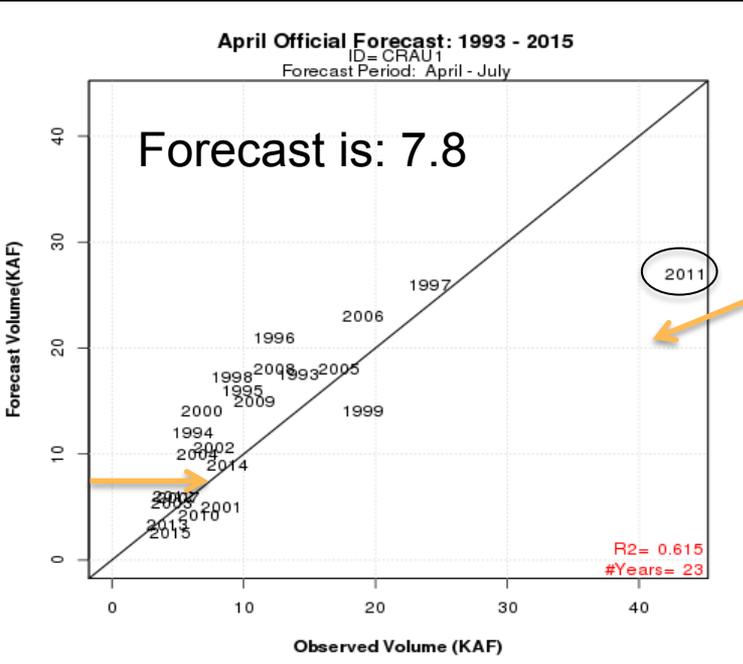
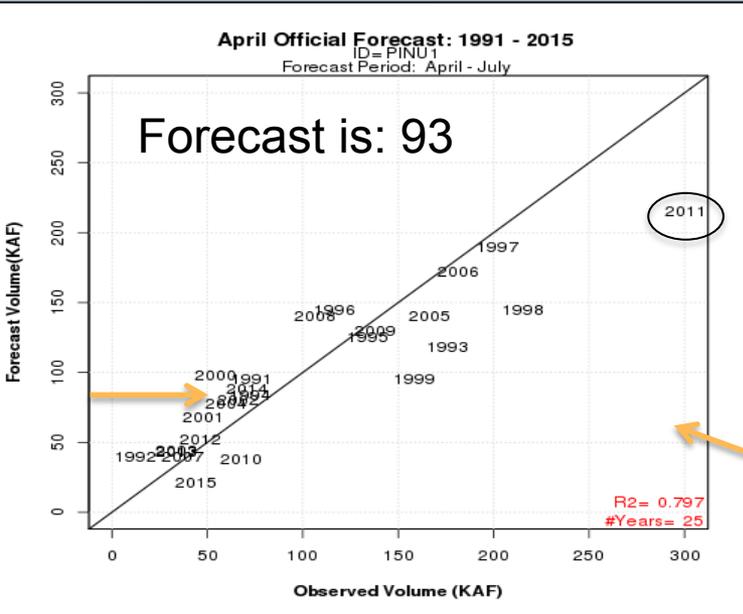


**We Do Better:**  
 Headwaters  
 Primarily snow melt basins  
 Known diversions / demands

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

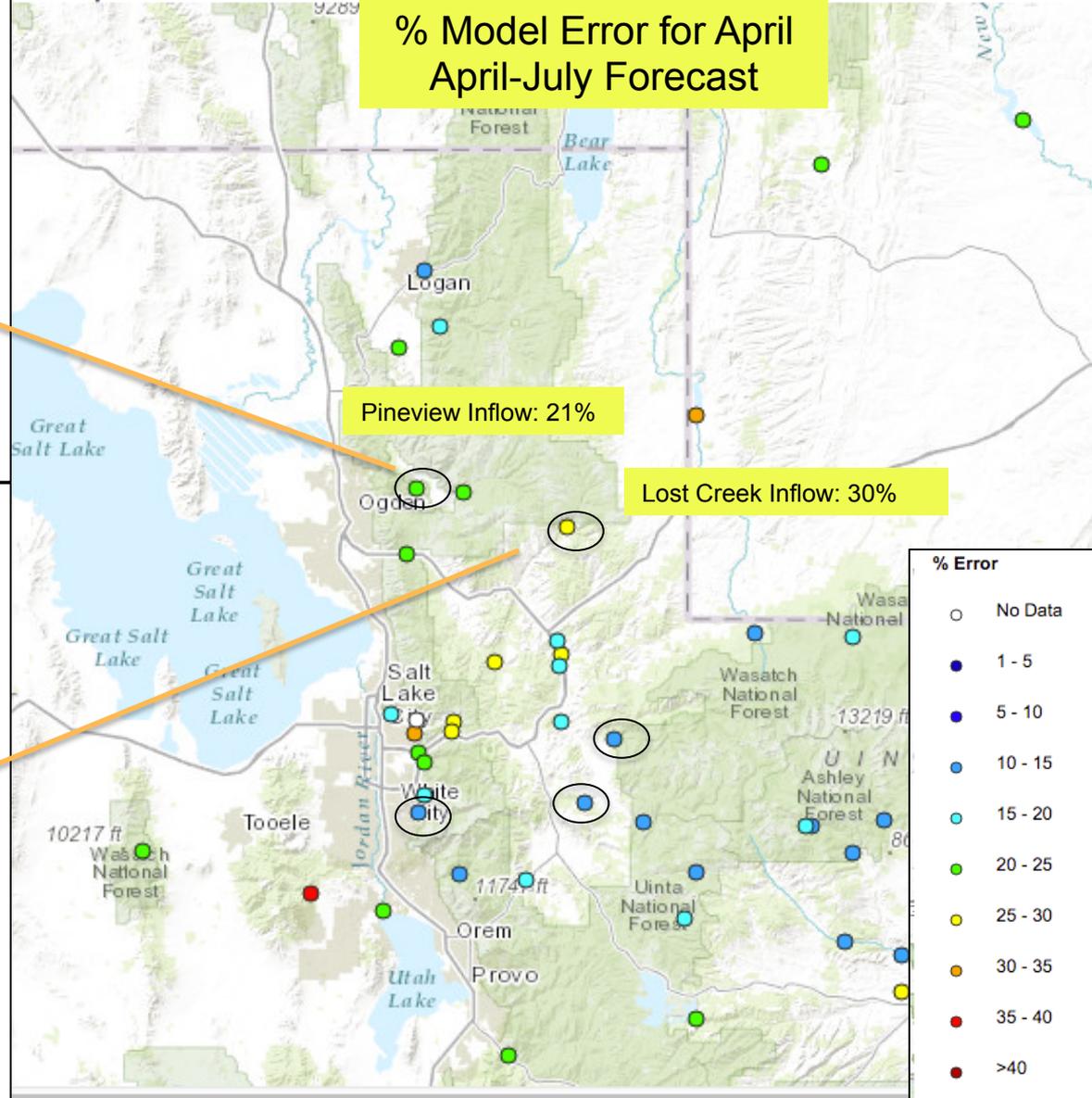
**Sources of Uncertainty:**  
 Current conditions → model snow states  
 Future weather

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

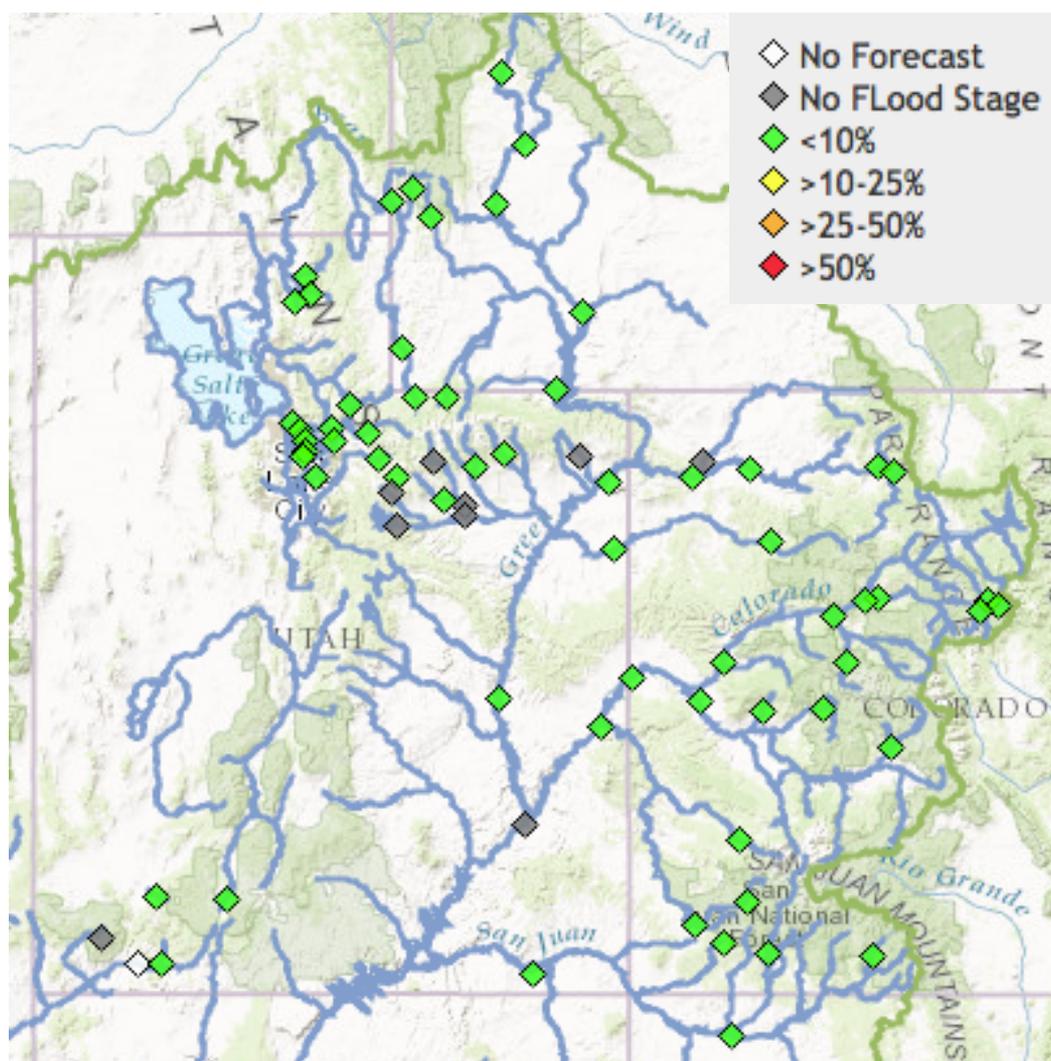


## July Verification - April

Click Map to Zoom



# 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](http://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>

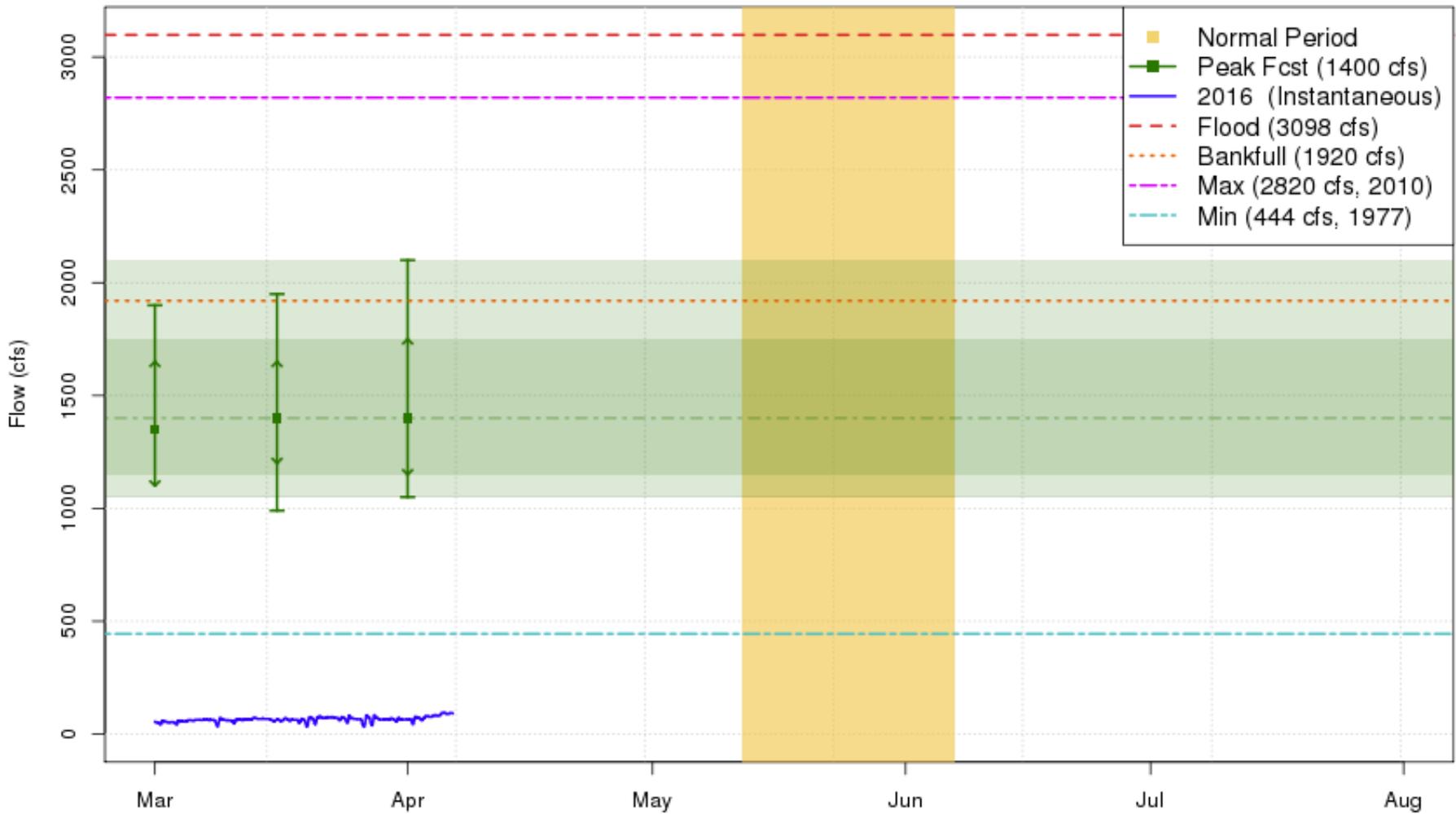
## Peak Flow Forecast Summary (mean daily CFS)

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

[www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov) - “Rivers drop down menu” – select peak flow information

# Peak Flow Forecast Summary (mean daily CFS)

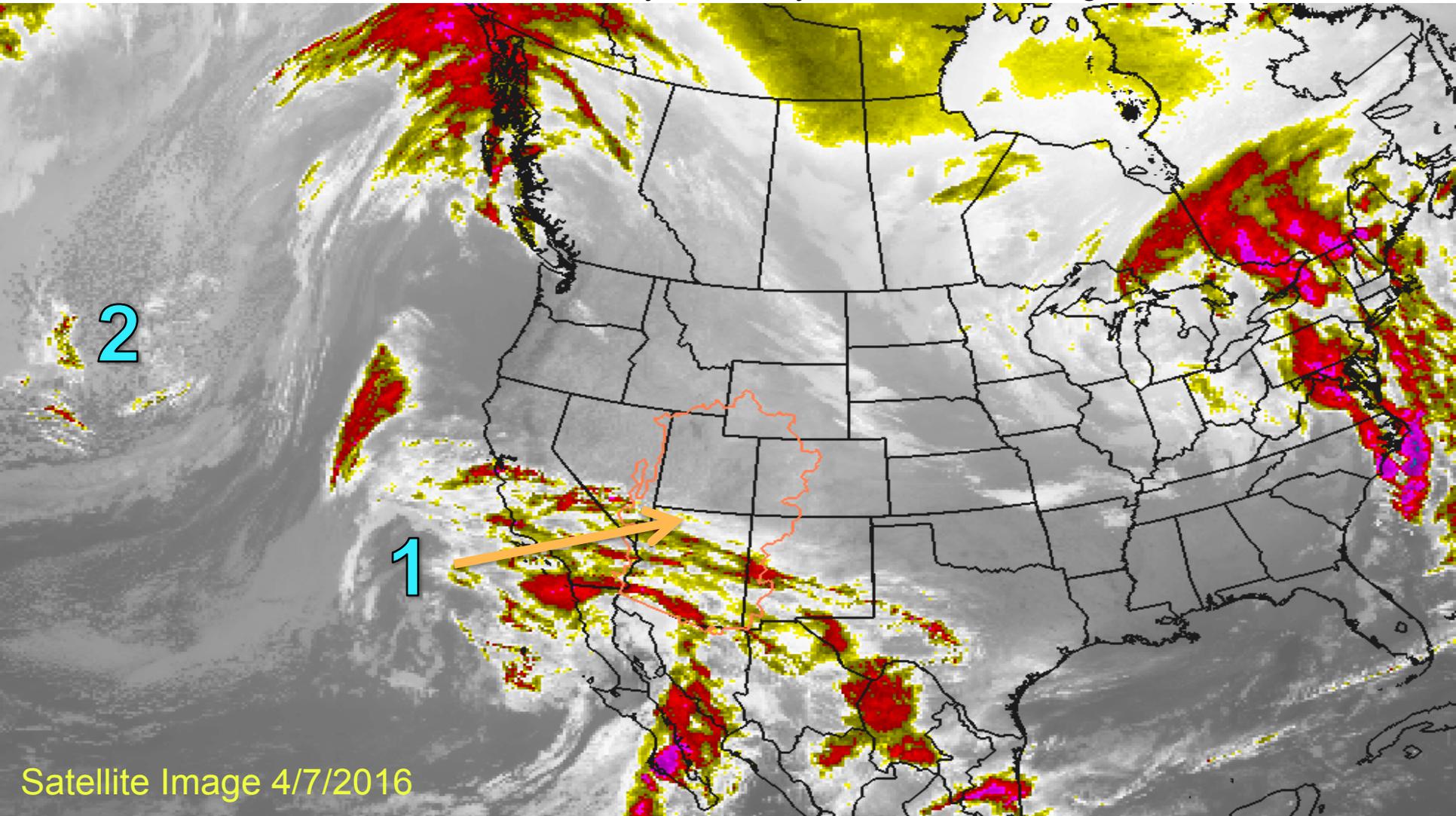
2016 Mean Daily Peak Flow Forecast  
Provo - Woodland- Nr (WOOU1)



These graphics are updated approximately every two weeks between 3/1 and 5/1  
Plot Created 2016-04-06 07:34:58  
CBRFC / NWS / NOAA

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

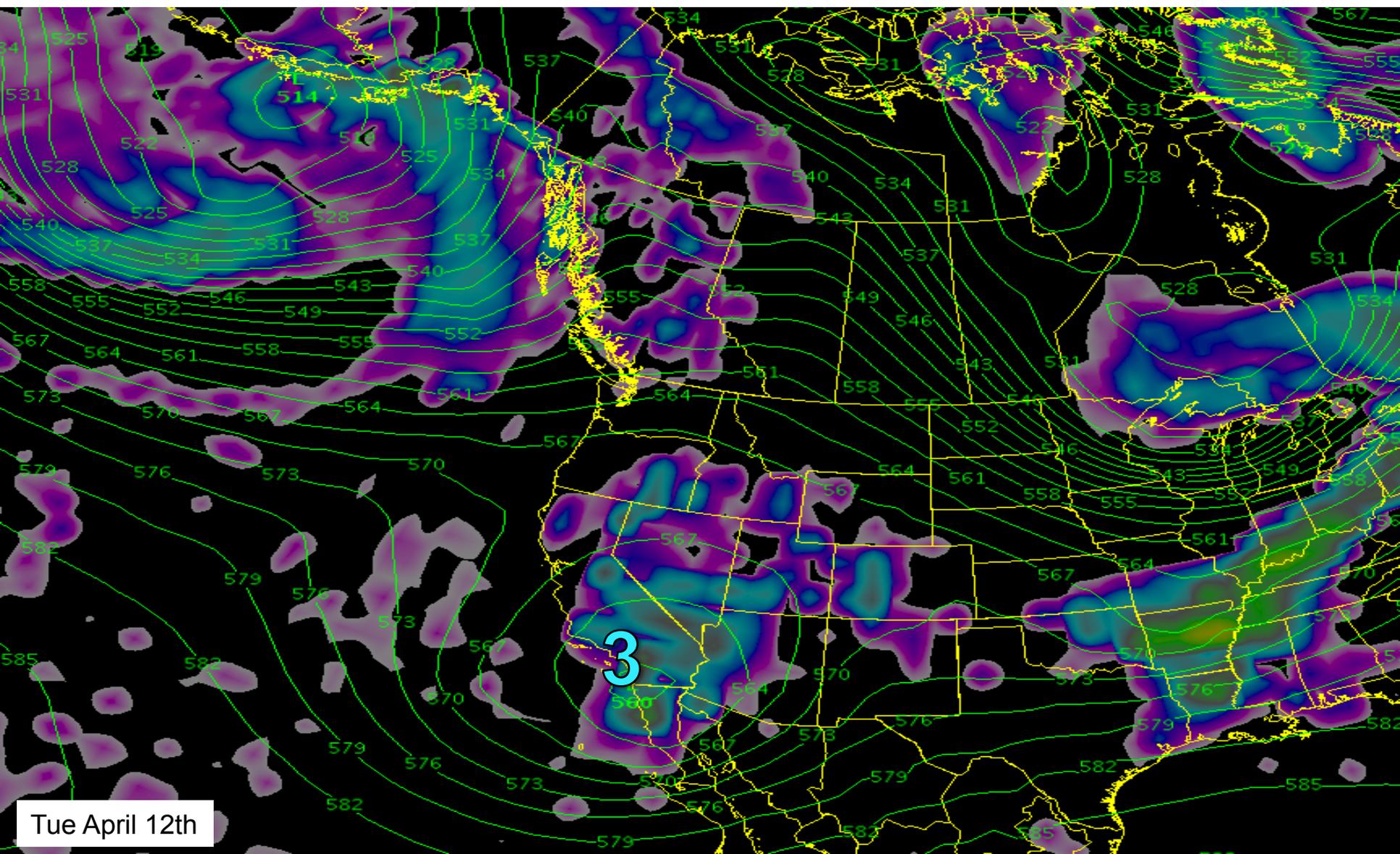
- 1 - Storm system will weaken and spread moisture / scattered showers into desert southwest through Friday. Warm system with rain at higher elevations.
- 2 – This will strengthen and follow the same path as storm 1. Scattered showers will increase over the entire area this weekend into Monday. Warm system with rain at higher elevations.



Satellite Image 4/7/2016

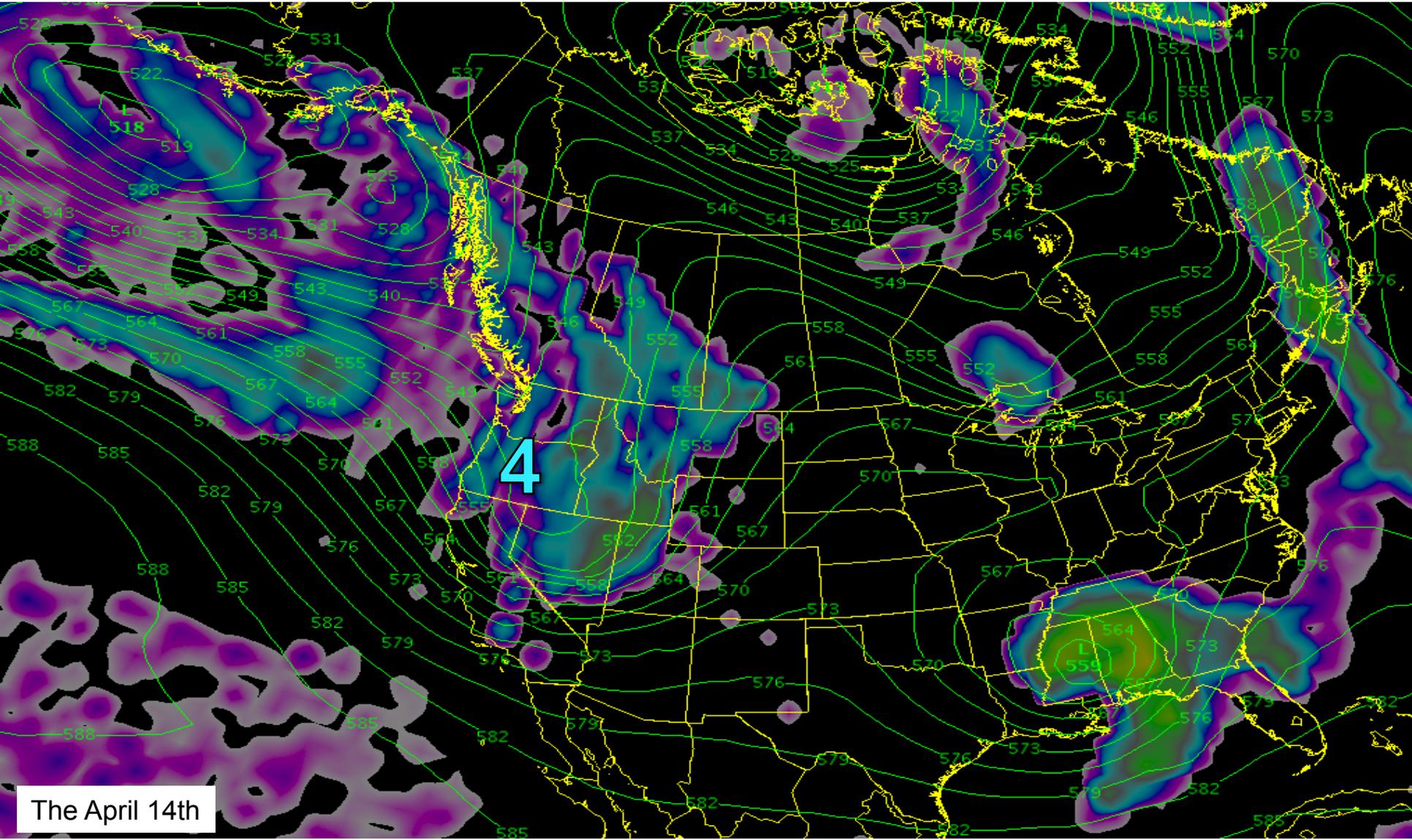
# Weather outlook

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



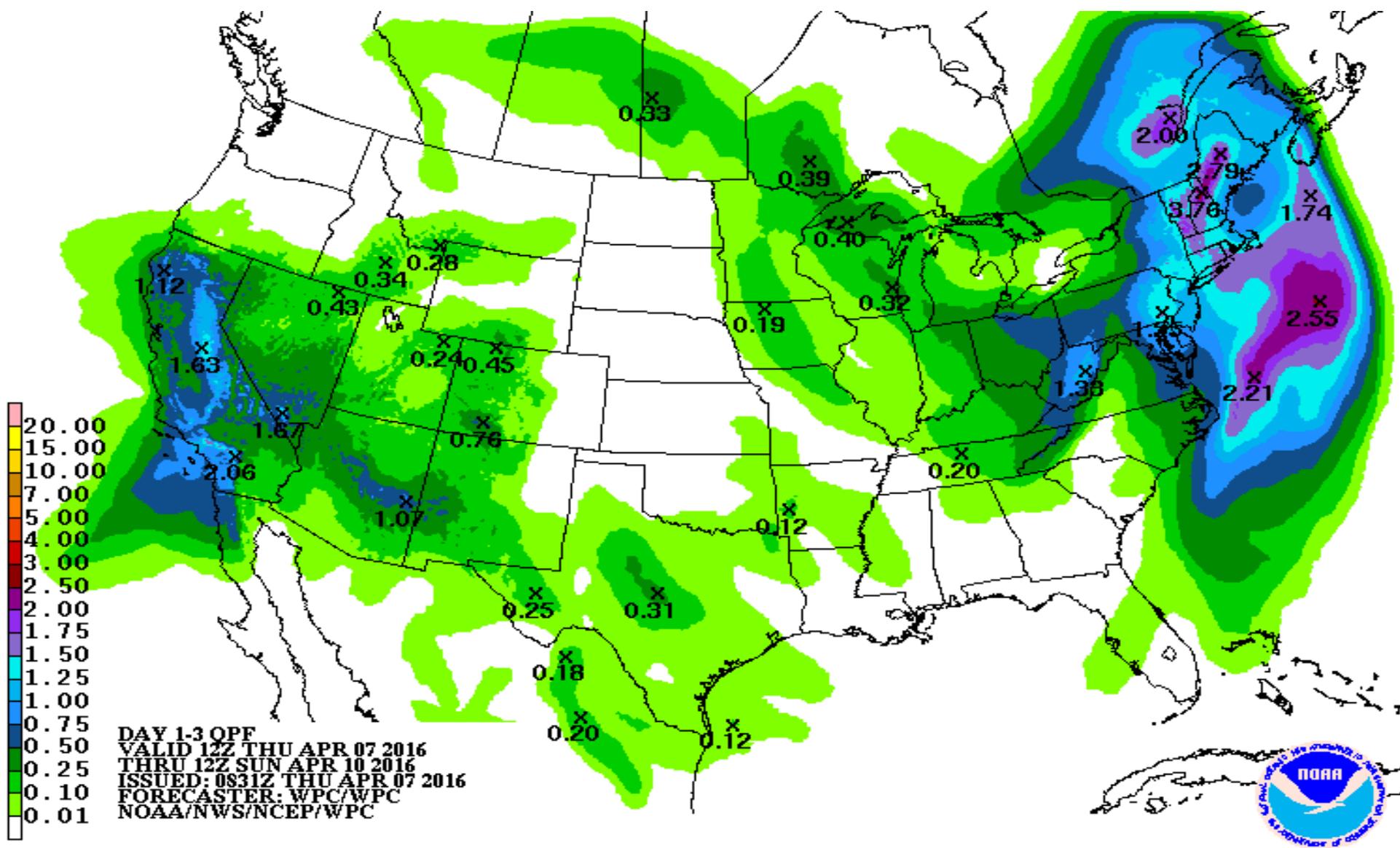
# Weather outlook

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.

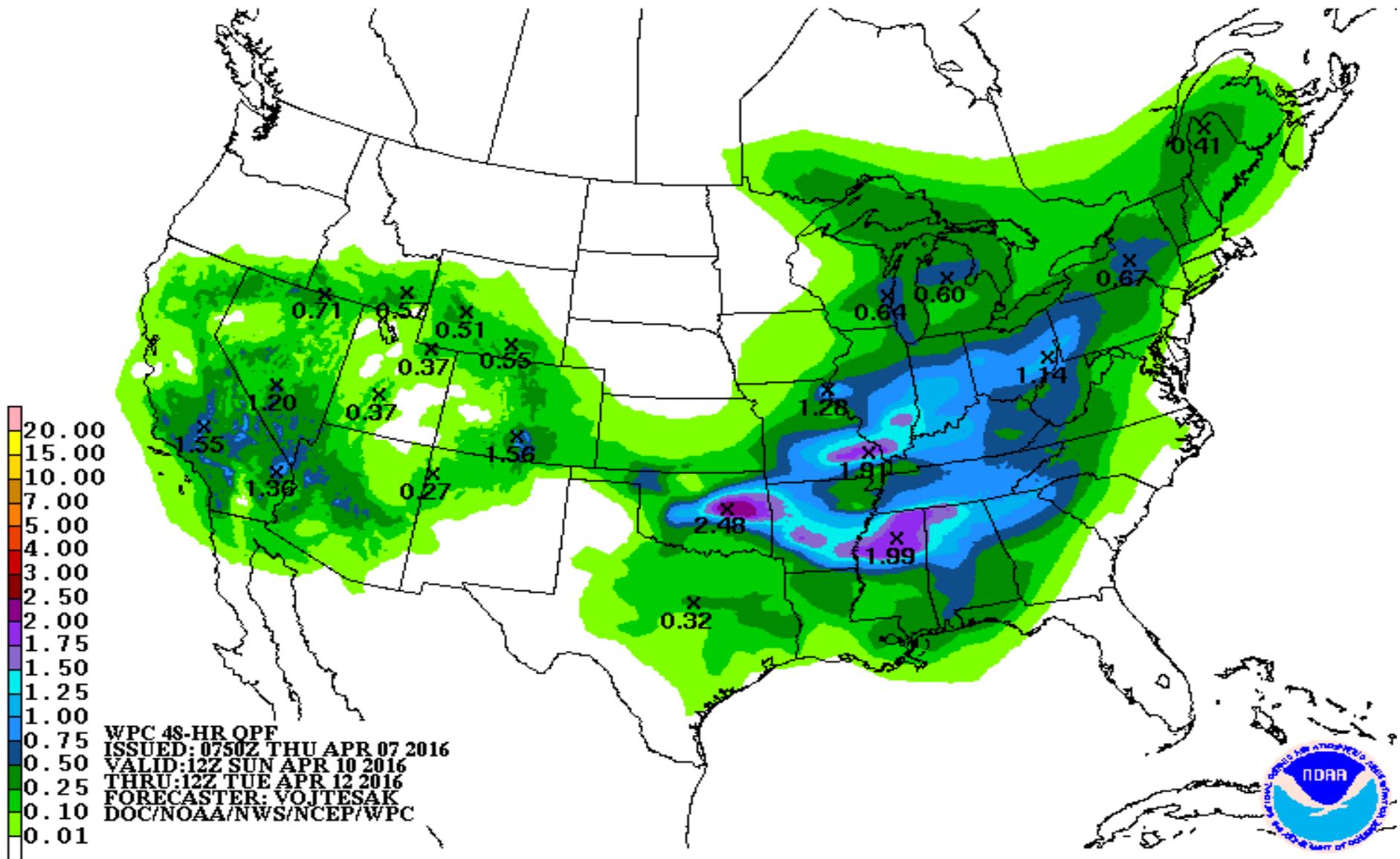


The April 14th

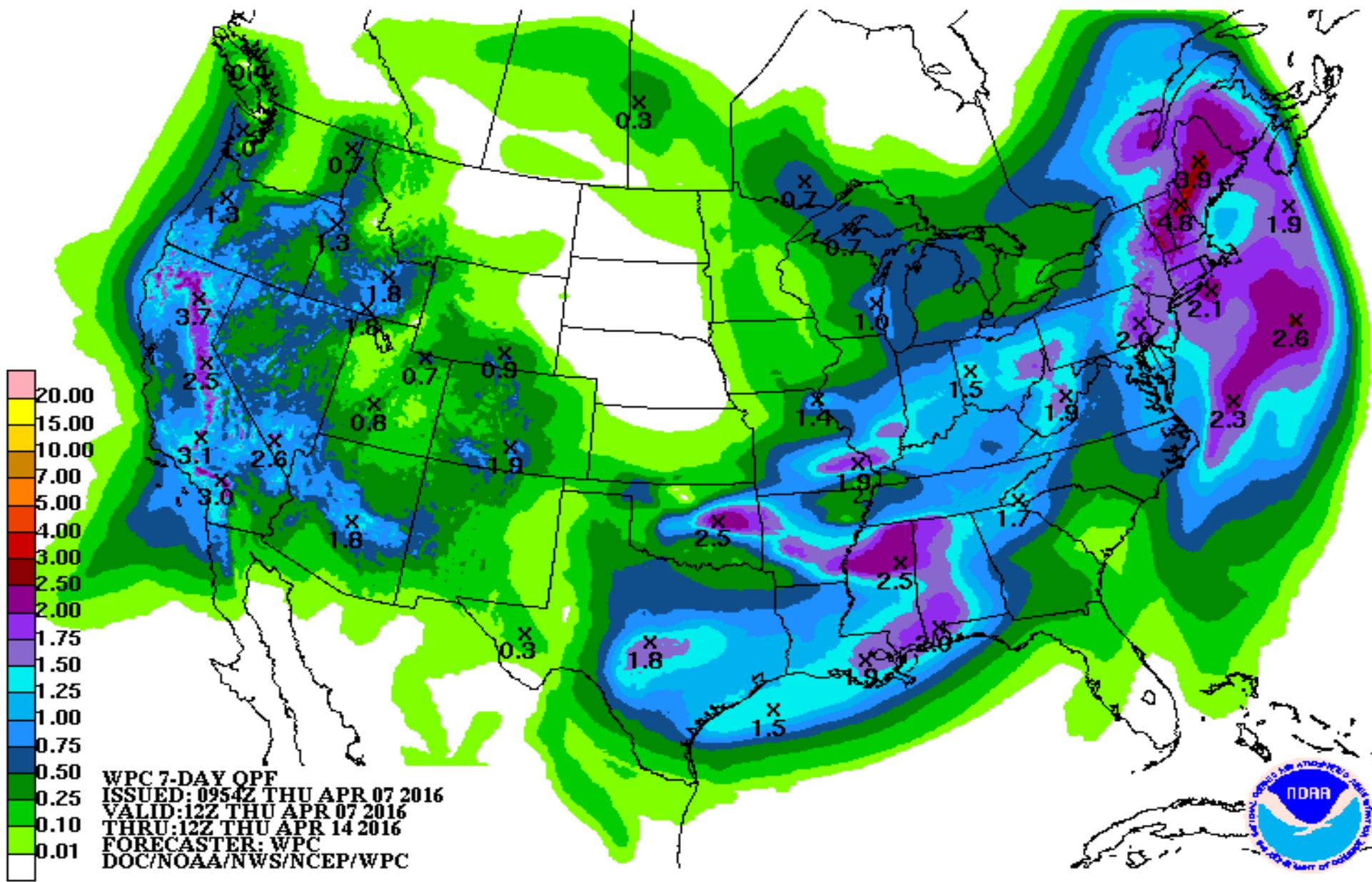
# Precipitation Outlook: Thu Apr 7<sup>th</sup> – Sun Apr 10<sup>th</sup>



# Precipitation Outlook: Sun Apr 10<sup>th</sup> – Tue Apr 12<sup>th</sup>

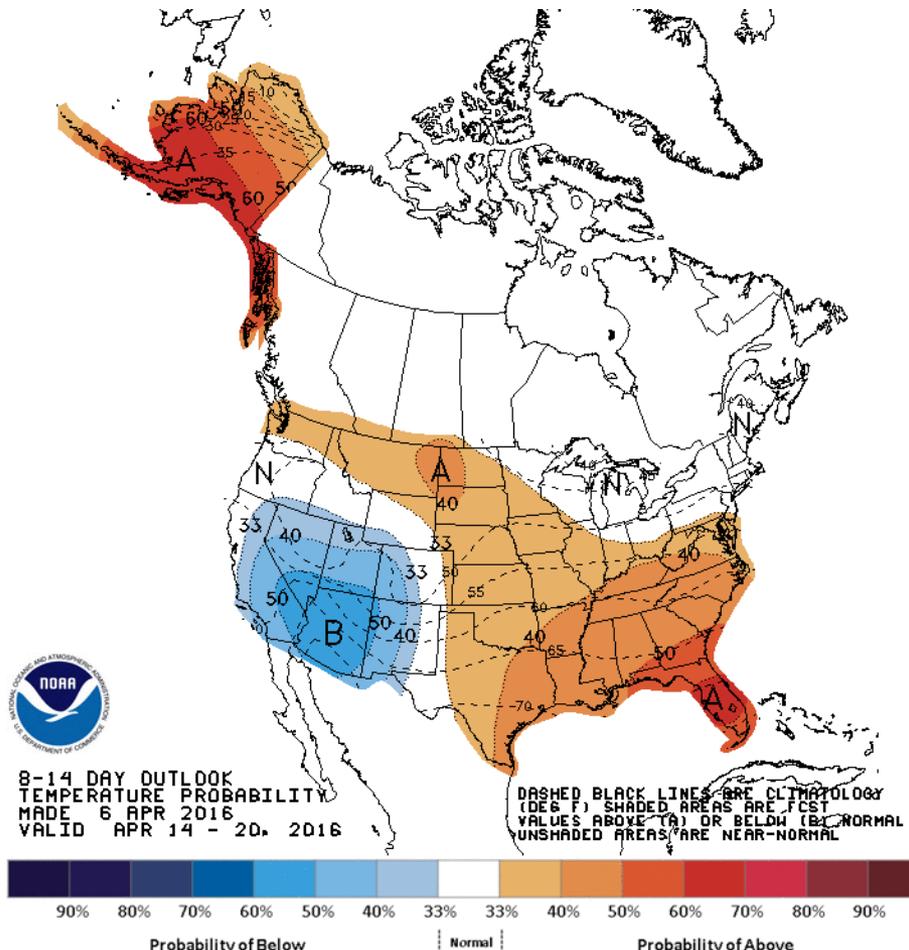
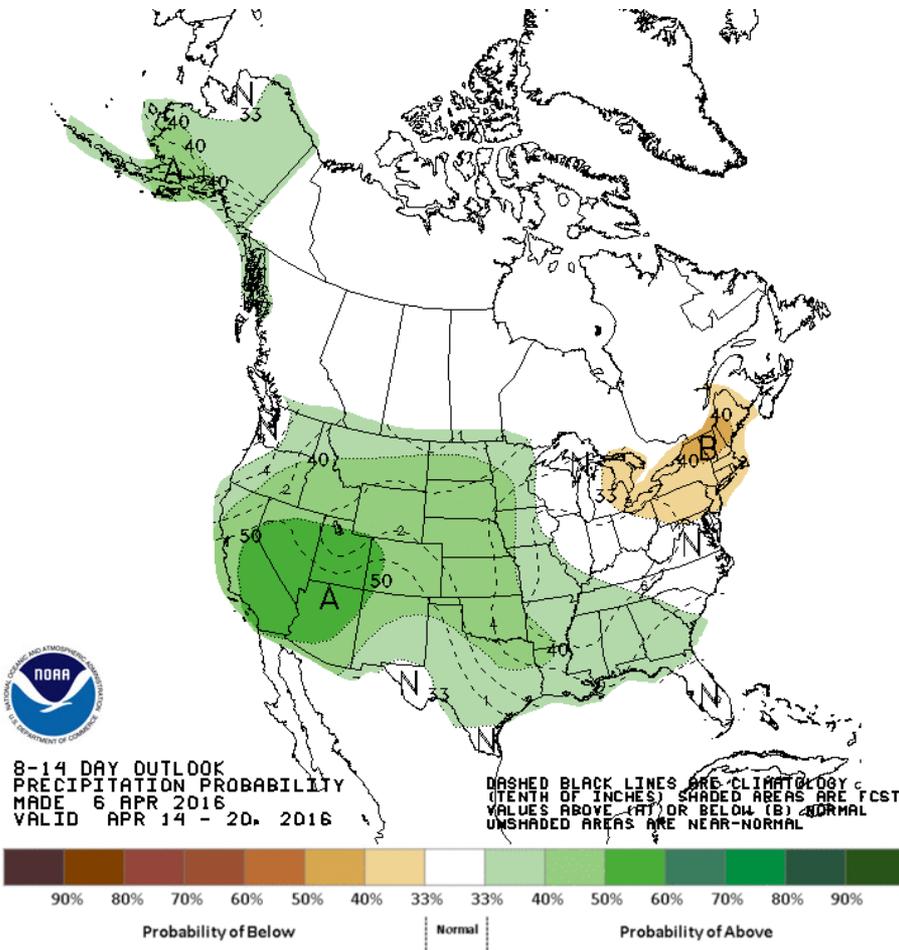


# Precipitation Outlook: 7-Day Total (Apr 7<sup>th</sup> – Apr 14<sup>th</sup>)



# Weather outlook: April 14<sup>th</sup> – April 20<sup>th</sup>

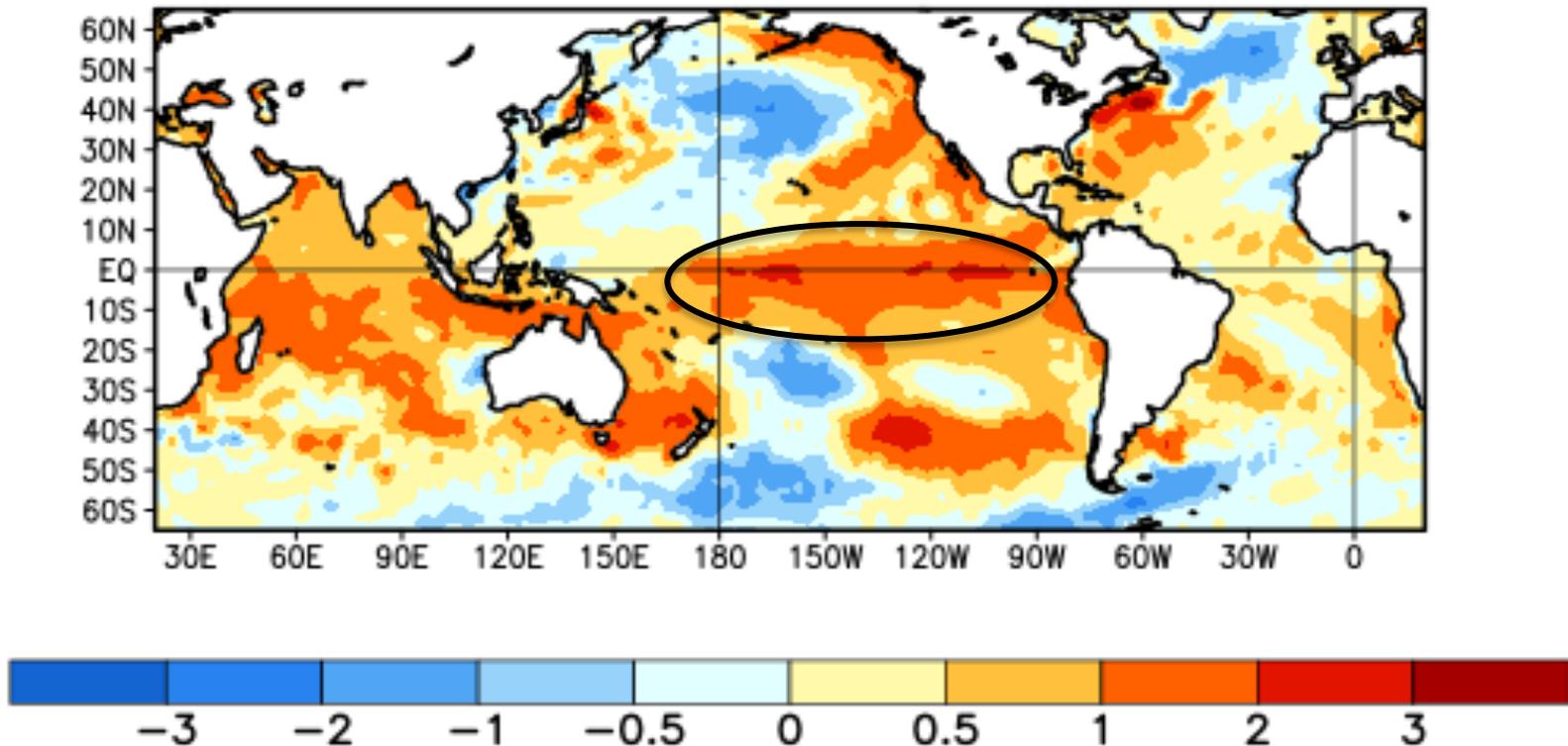
## Climate Prediction Center 8-14 day outlook



# El Niño Event

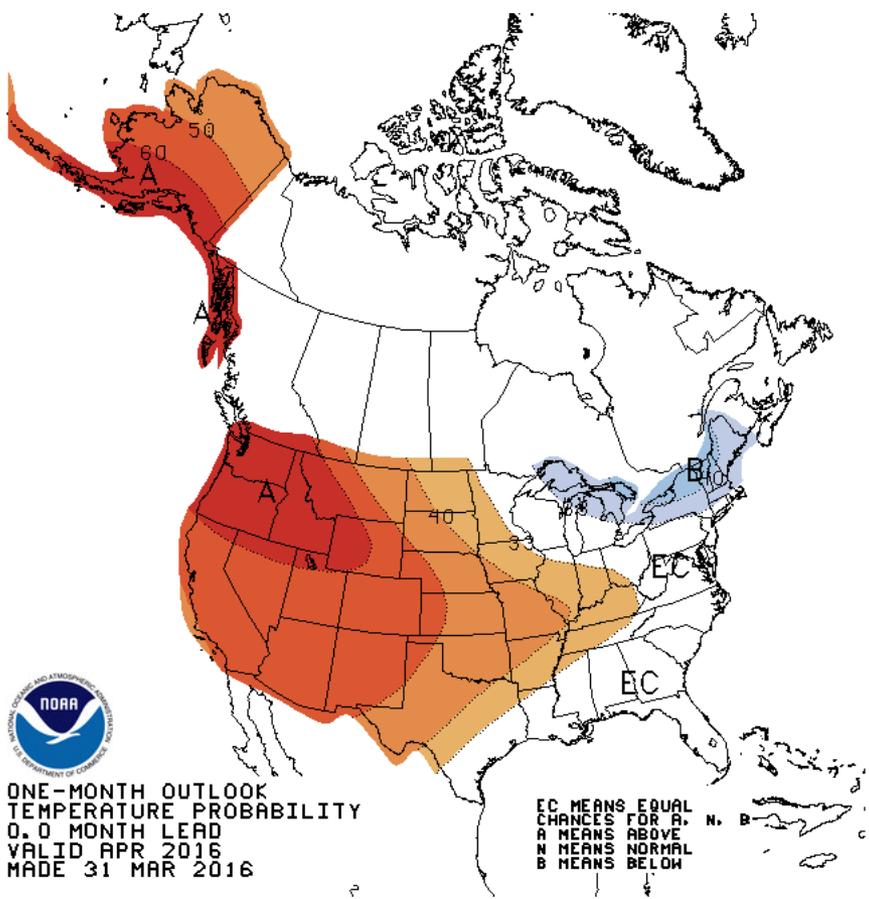
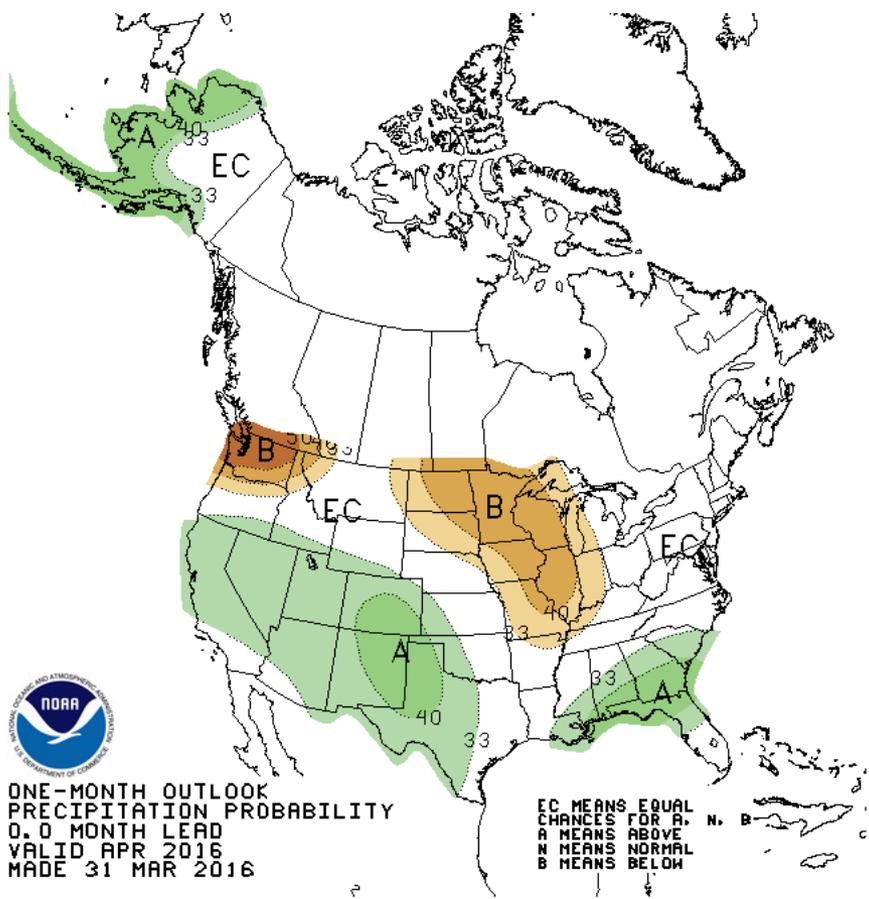
- Still a strong event but has been weakening over the past several weeks.
- The 2015-2016 will go down as one of the strongest on record (82-83, 97-98)
- Impacts the Jet stream strength, location, and storm tracks (favors LC Basin)
- No solid correlation between ENSO and April-July runoff volumes in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

**Average SST Anomalies**  
**6 MAR 2016 – 2 APR 2016**



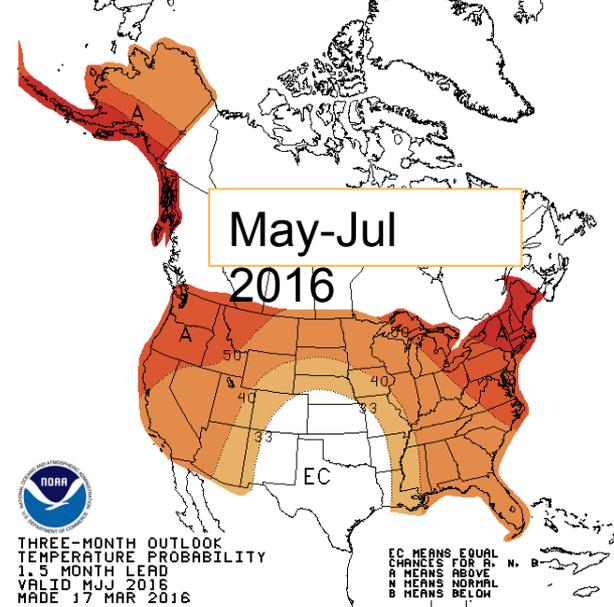
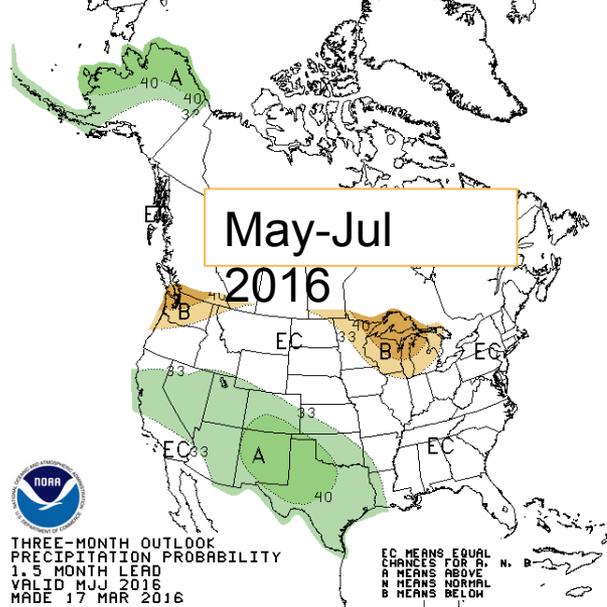
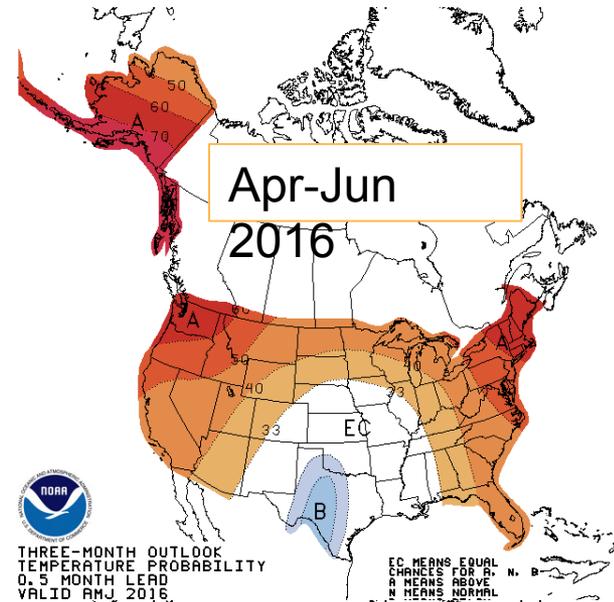
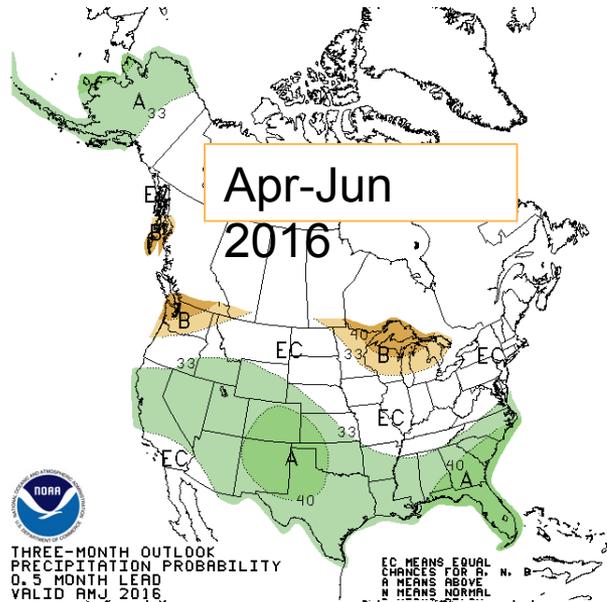
# Long range outlook: Climate Prediction Center

## 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.

Great Basin water supply focal points:

Paul Miller [paul.miller@noaa.gov](mailto:paul.miller@noaa.gov)

Brent Bernard [brent.bernard@noaa.gov](mailto:brent.bernard@noaa.gov)

Sevier River Basin water supply focal point:

Tracy Cox [tracy.cox@noaa.gov](mailto: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](http://www.cbrfc.noaa.gov/present/present2016.cgi)