

CBRFC Forecast Areas

Great Basin / Utah Water Supply Briefing

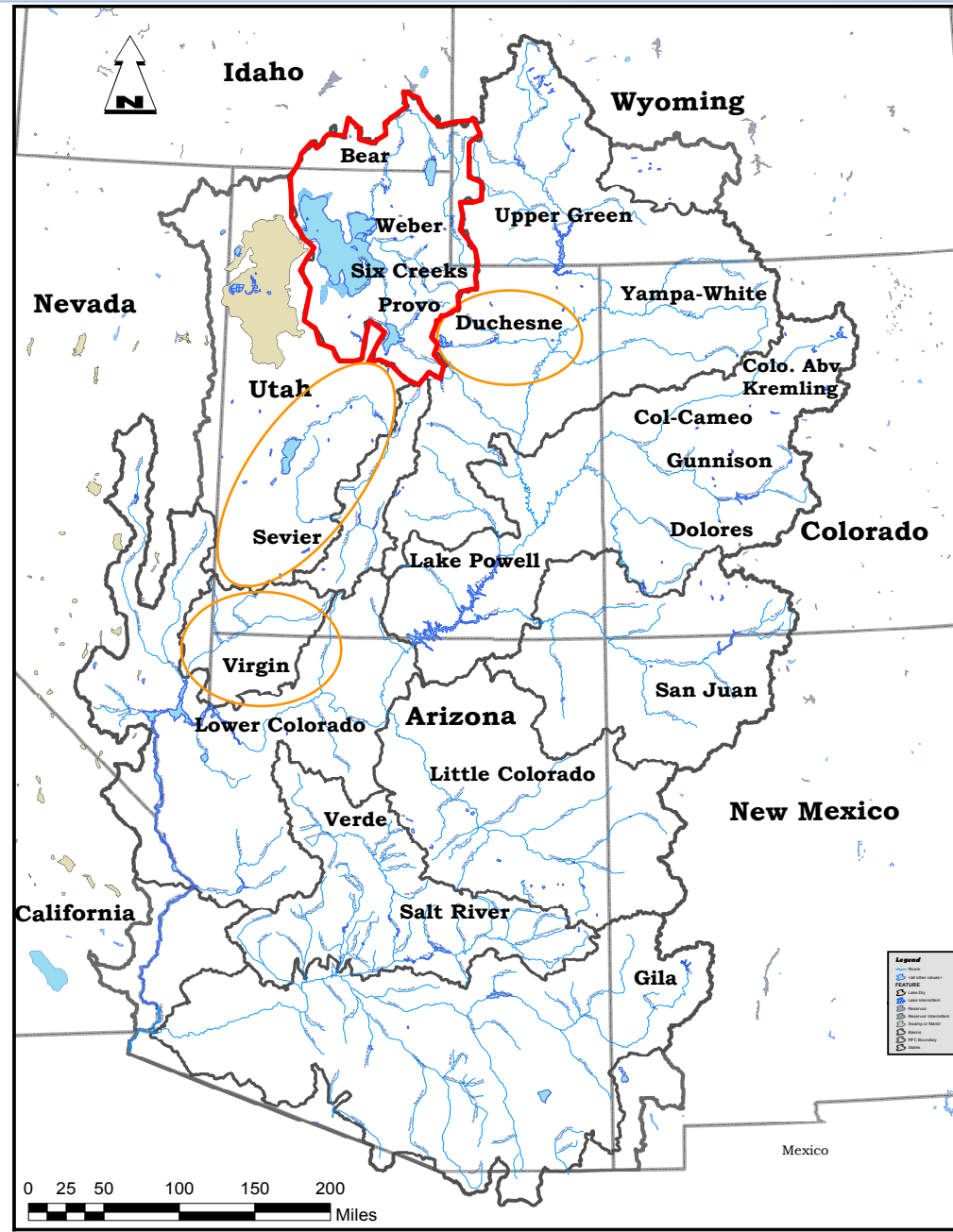
April 6, 2018

Greg Smith - Sr. Hydrologist
Colorado Basin River Forecast Center

Phone: 1-877-929-0660

Passcode: 1706374

Please mute your phone
until ready to ask questions



Today's Presentation

March weather – A dry start but the second half of the month was more active

Current snowpack – Dismal overall but maintained high elevation snow during March

2018 water supply forecasts – April update

Select forecast site review – Evolution Plots – The odds of reaching average.

Forecast error – Improves through the spring.

Brief peak flow information – Forecasts are below average at this time

Upcoming weather – Pattern remains active.

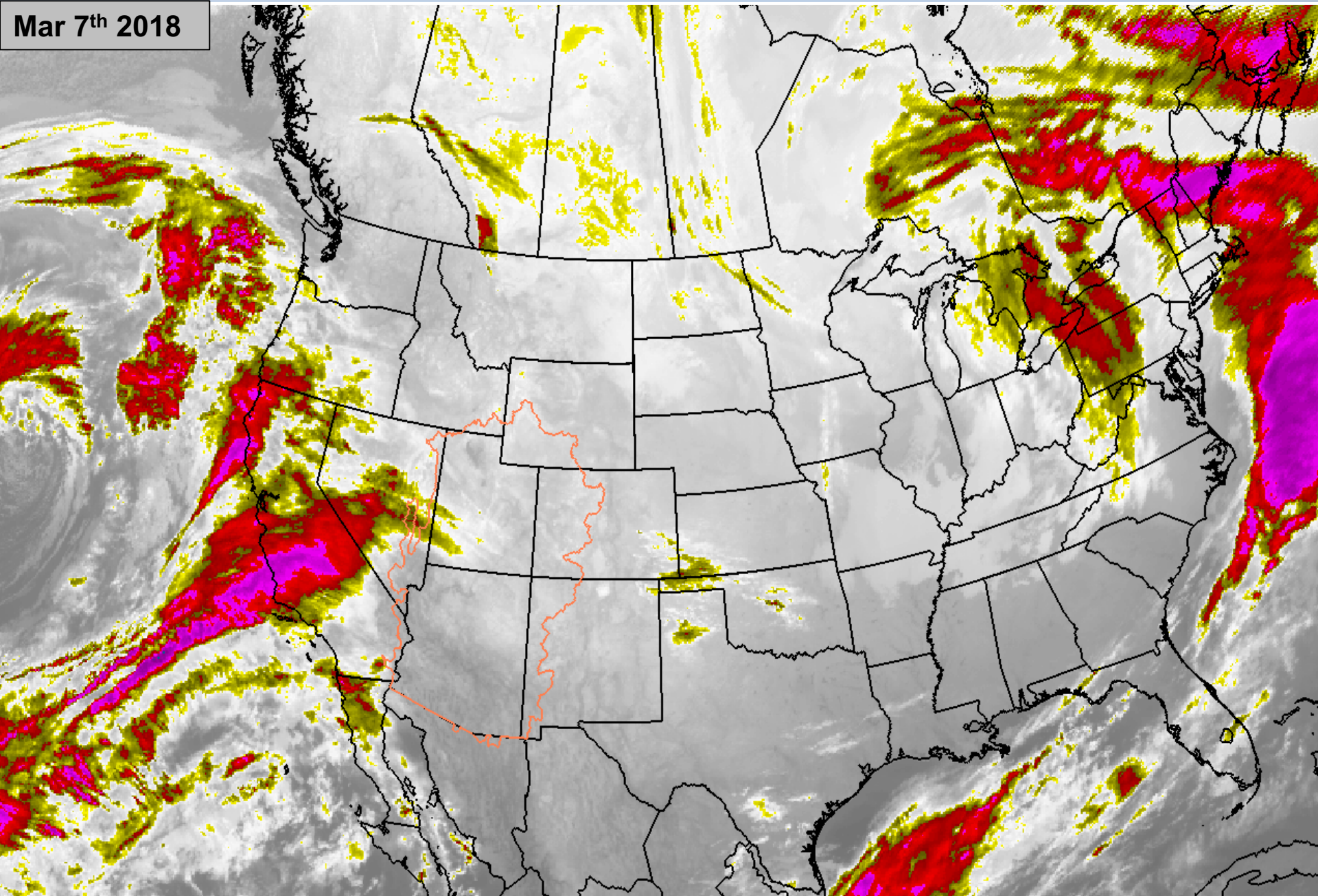
Contacts & Questions

Phone: 1-877-929-0660 Passcode: 1706374

*** Please mute your phone until the question period ***

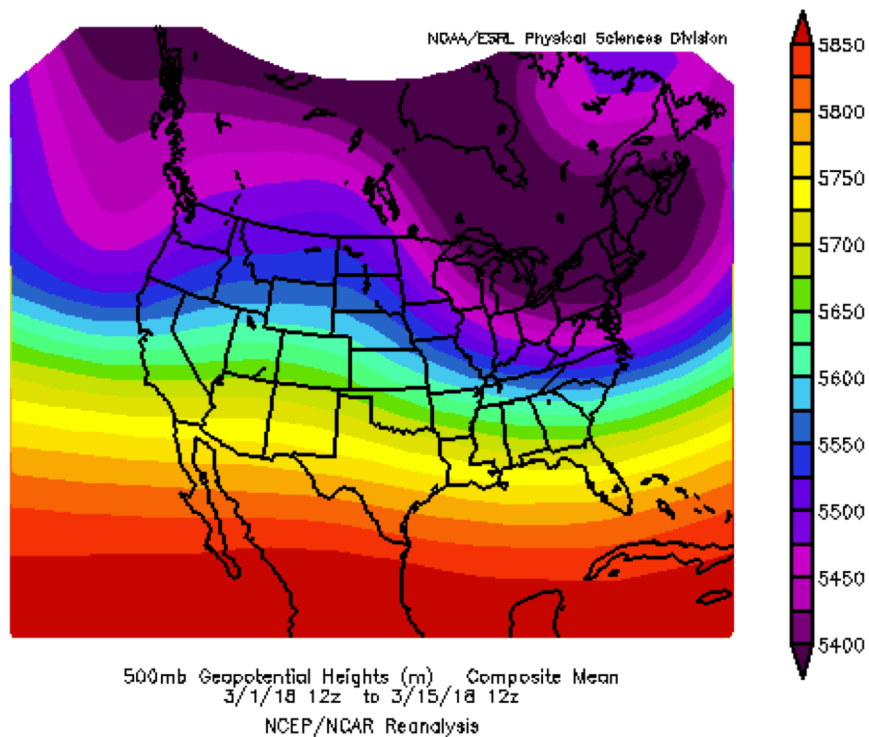
High pressure ridge over the area with dry conditions to start March

Mar 7th 2018



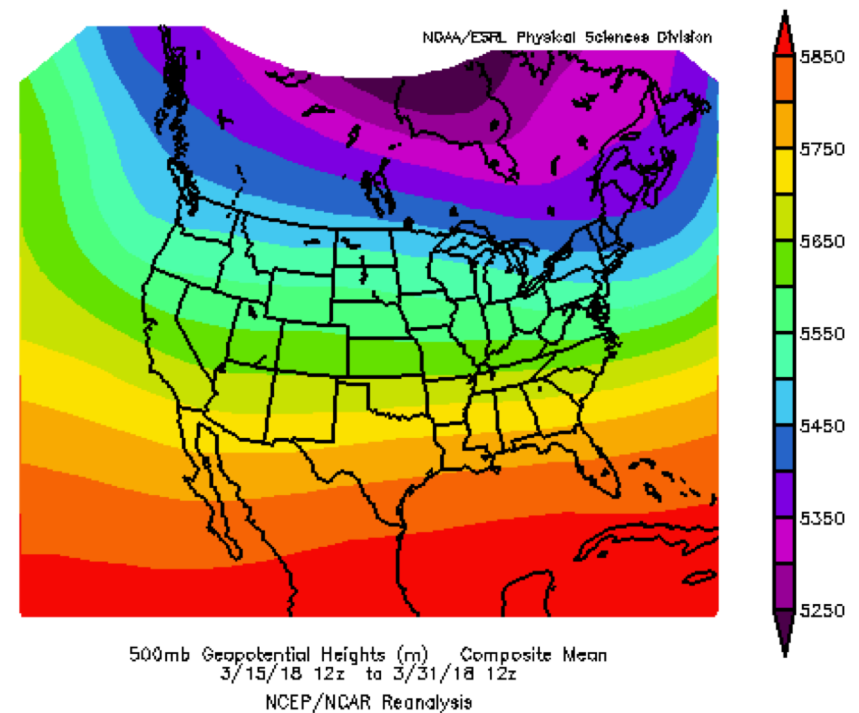
Mean Atmospheric Pattern March 2018

First half of March



High pressure ridge – generally dry conditions

Second half of March

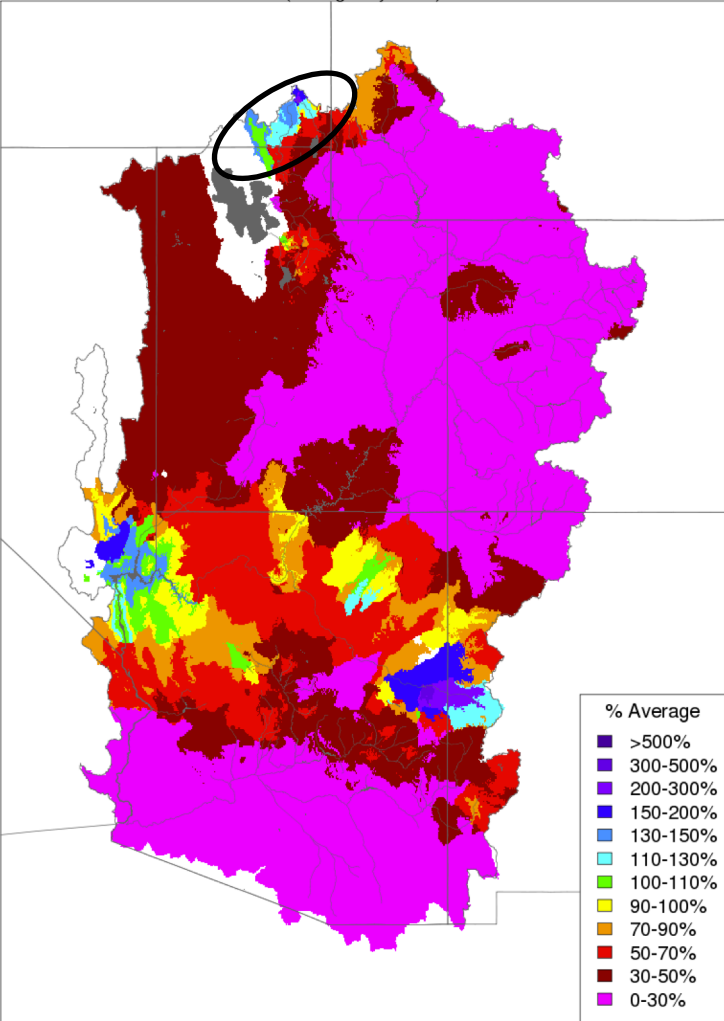


Increase in storm activity / precipitation
(primary impacts to northern basins)

March Precipitation – Partial and full month (% of average)

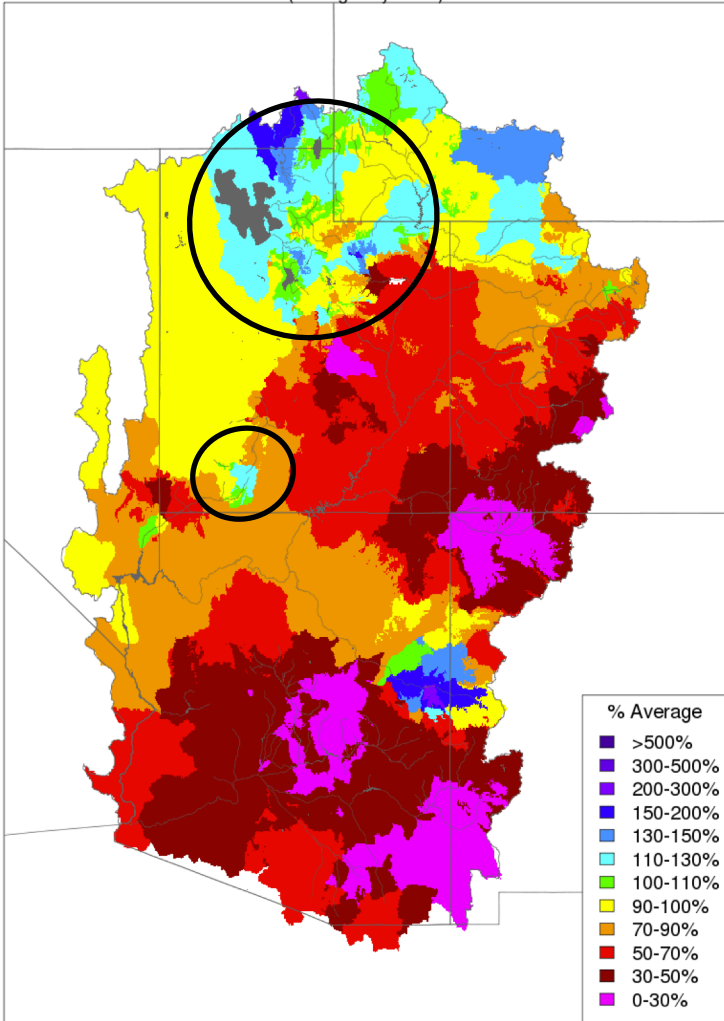
First half of March 2018

Month to Date Precipitation - March 14 2018
(Averaged by Basin)

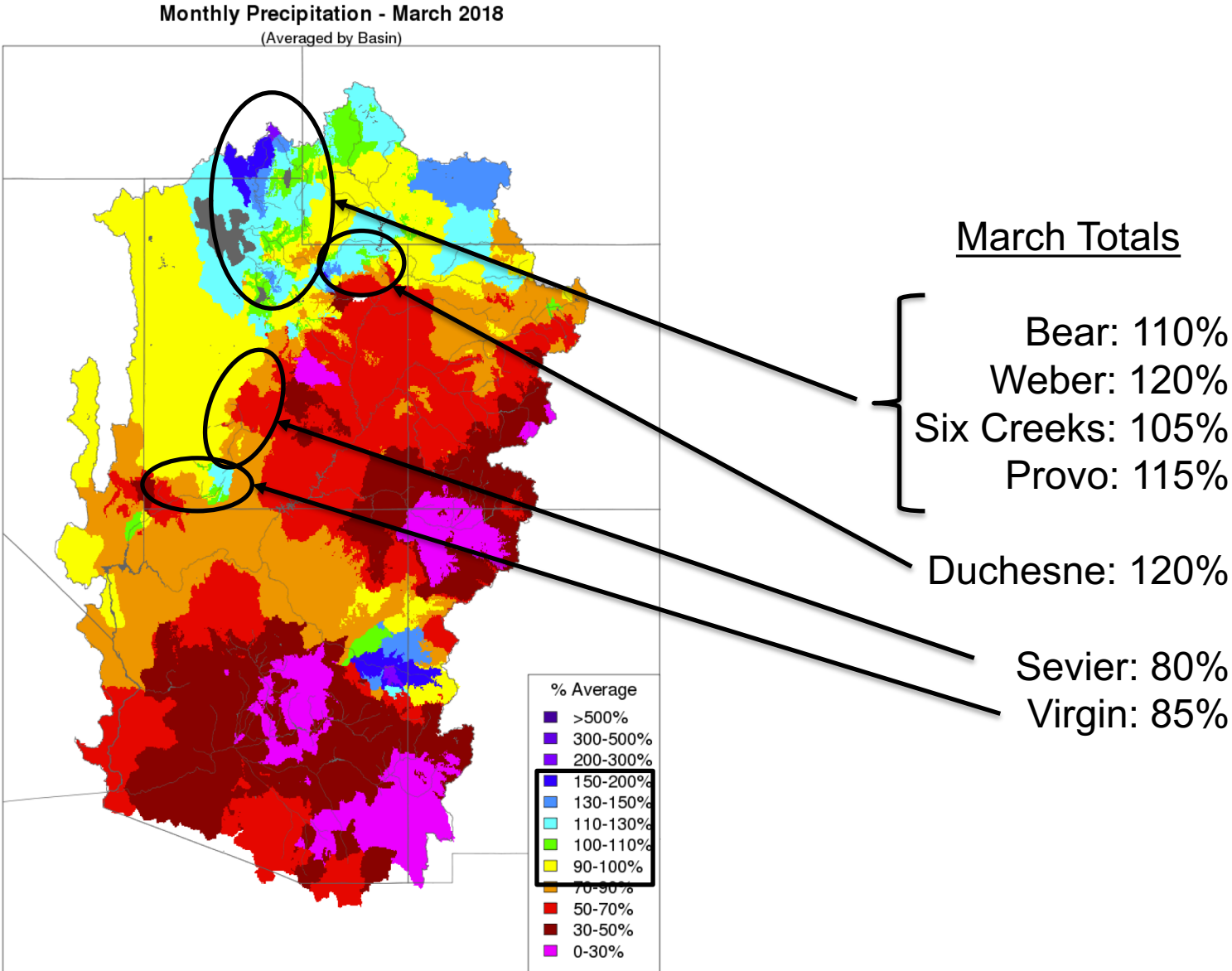


March 2018

Monthly Precipitation - March 2018
(Averaged by Basin)



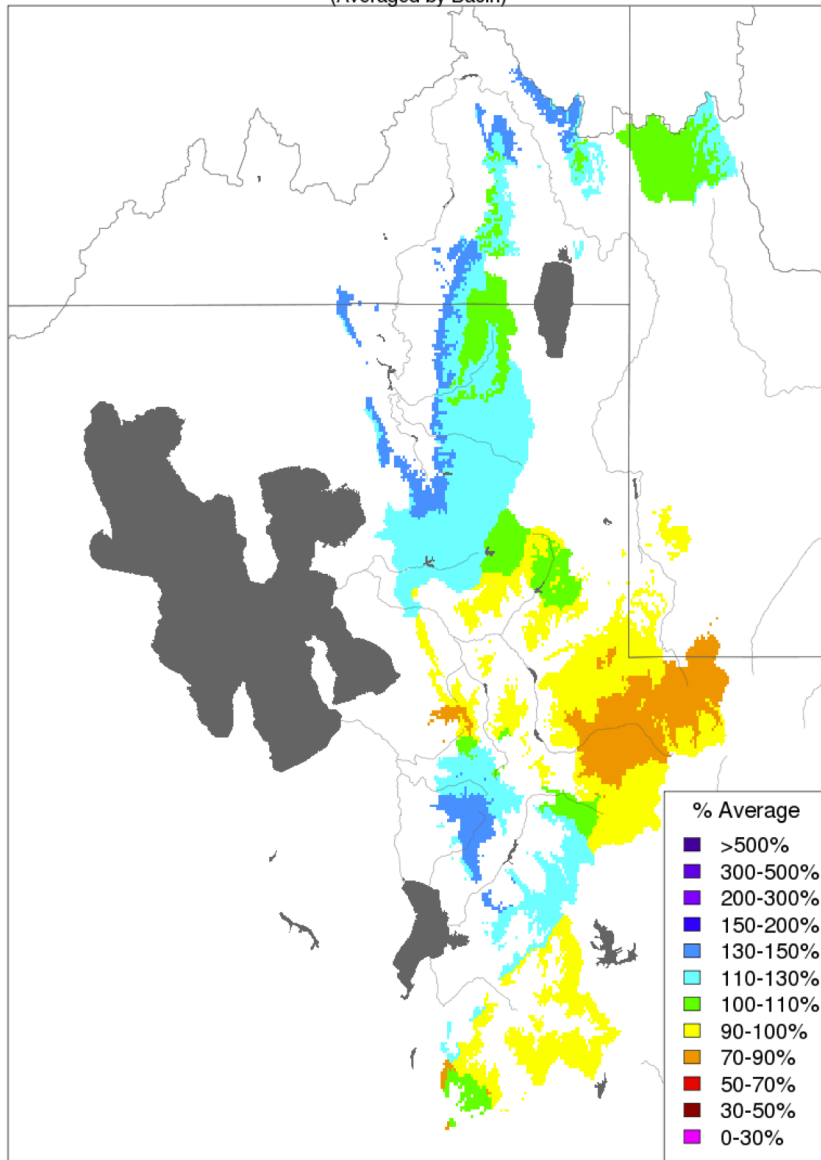
March Precipitation – full month % of average



March Precipitation – Primary runoff contributing areas

Monthly Precipitation - March 2018

(Averaged by Basin)



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

March Precipitation

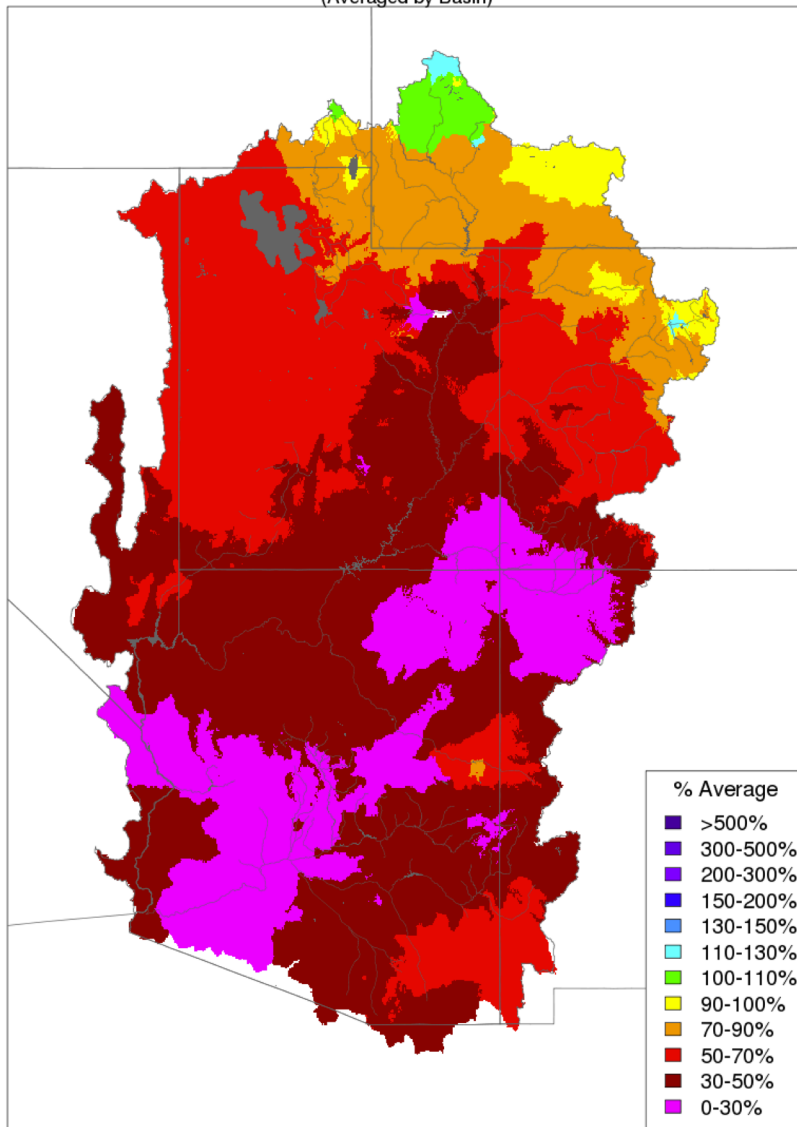
Warm storm systems – Rainfall at higher elevations
Snowpack didn't necessarily improve

Complex storm systems – Orographic effects
Some areas below average even though it was generally wet overall

Water Year Precipitation

Water Year Precipitation, October 2017 - March 2018

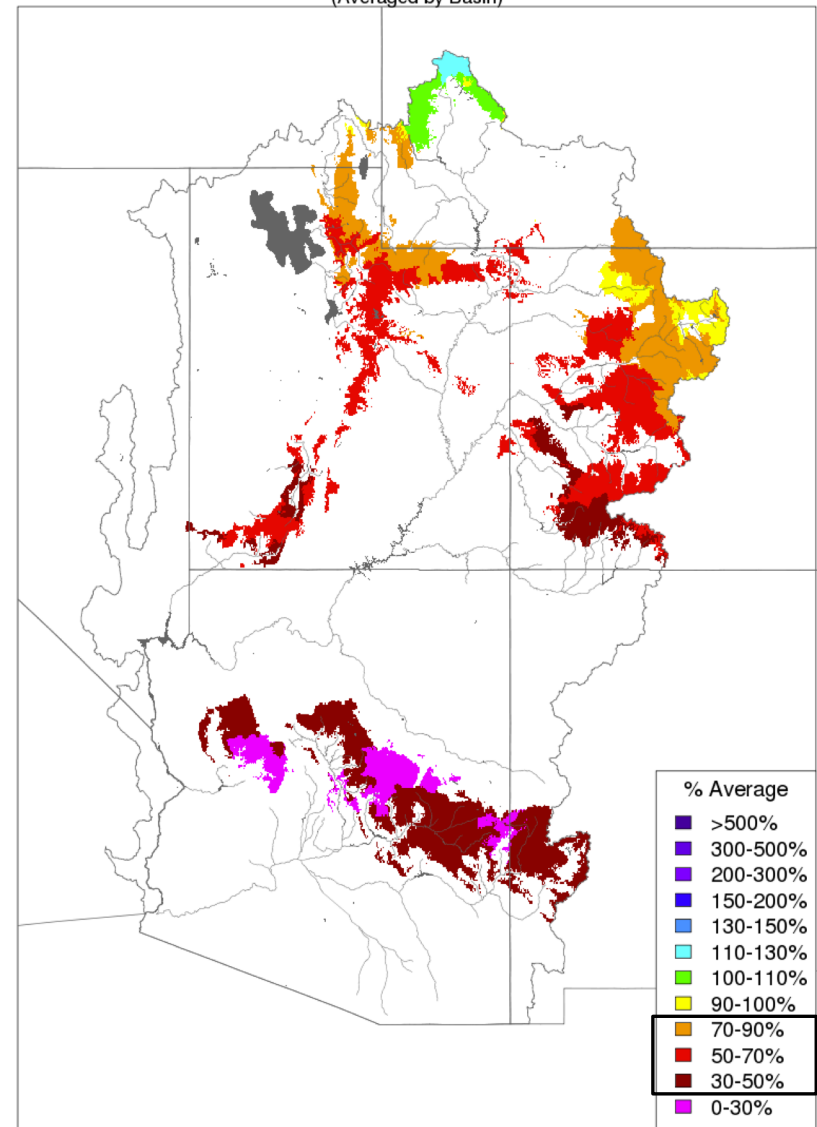
(Averaged by Basin)



Prepared by NOAA, Colorado Basin River Forecast Center
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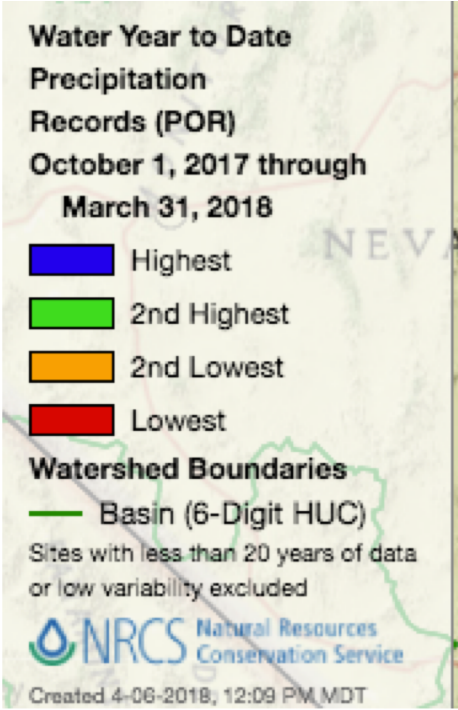
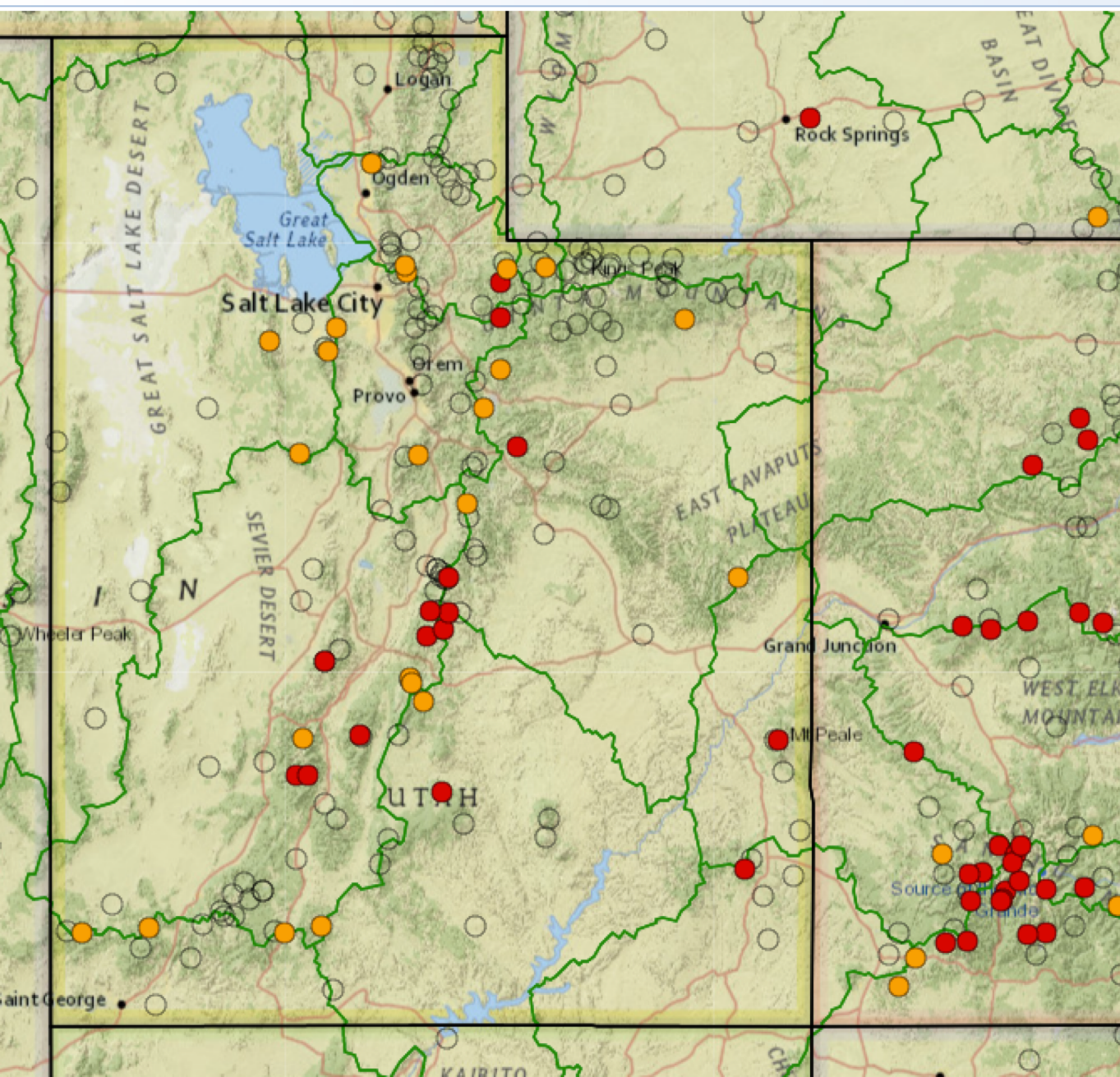
Water Year Precipitation, October 2017 - March 2018

(Averaged by Basin)



Prepared by NOAA, Colorado Basin River Forecast Center
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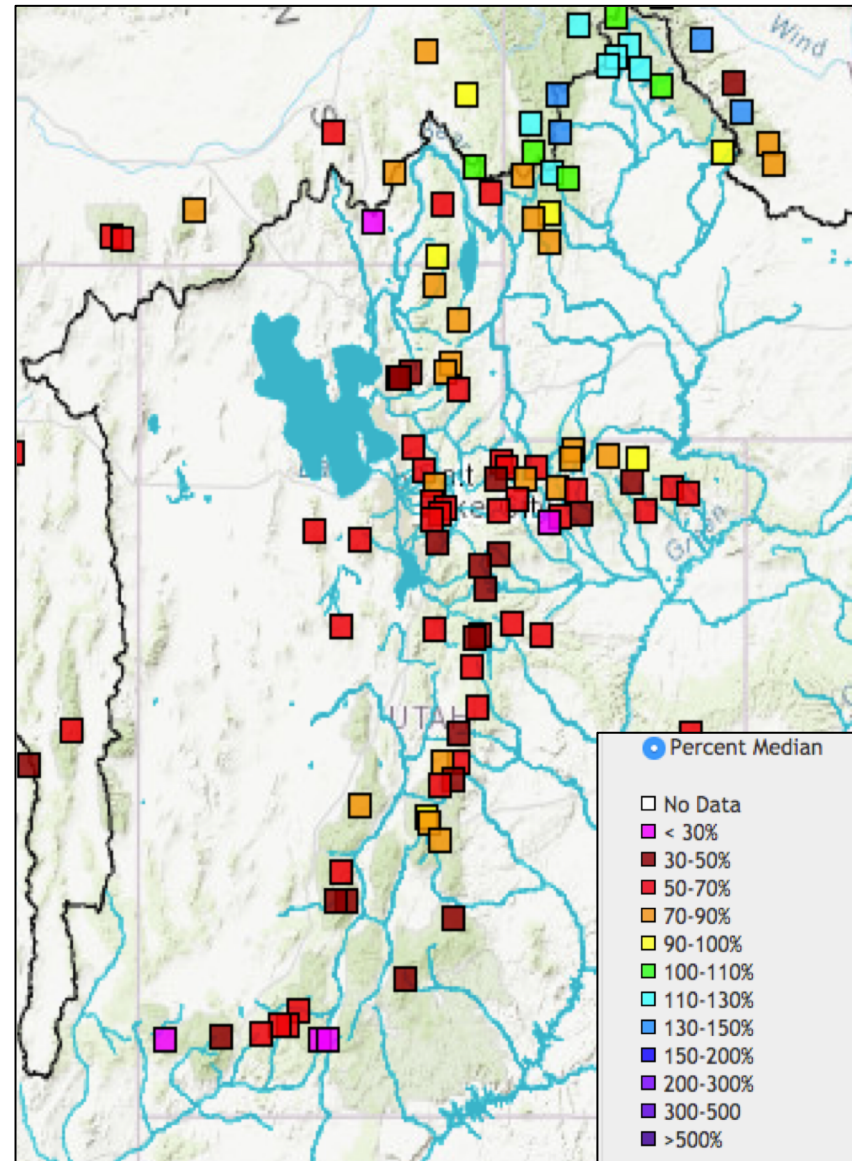
March Weather: Water Year Precipitation Historical Ranking



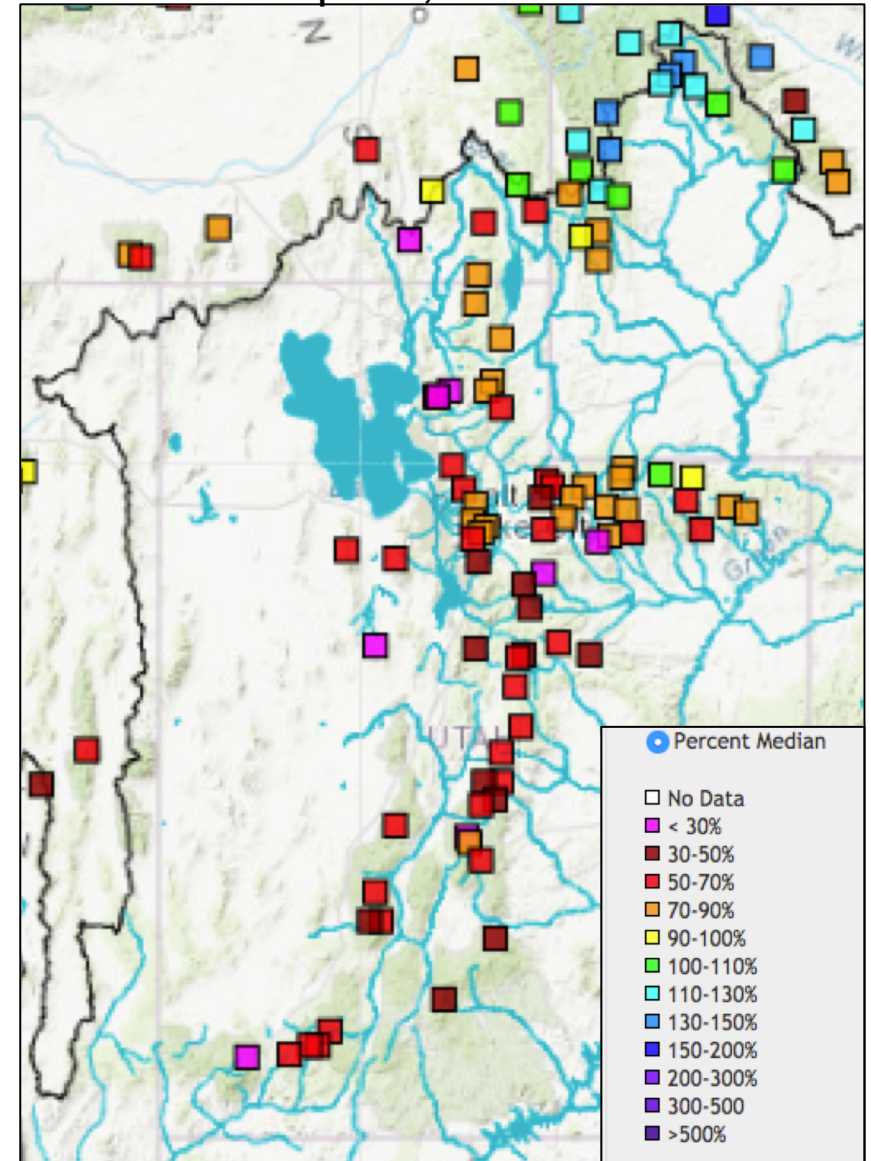
Snow Conditions

SNOTEL Snow Water Equivalent (% 1981-2010 median)

March 6, 2018



April 5, 2018

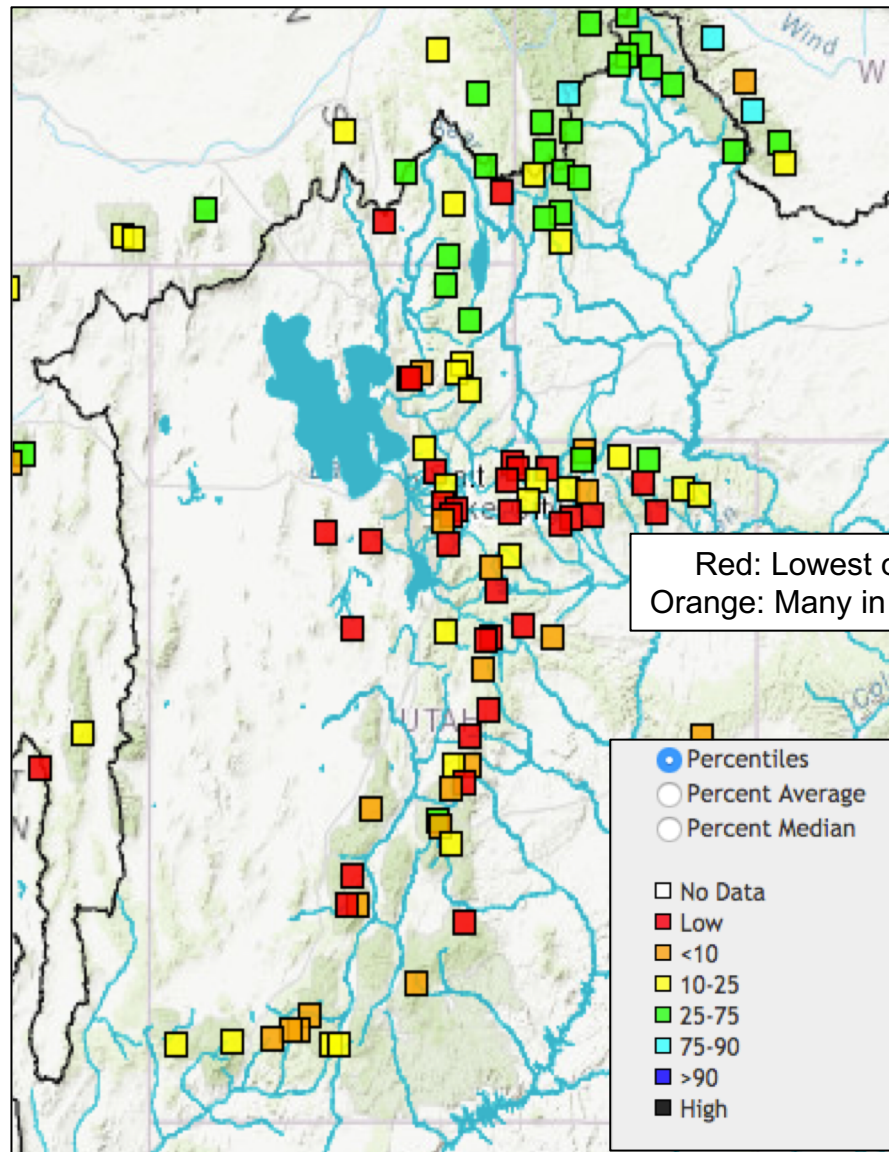


Snow Conditions

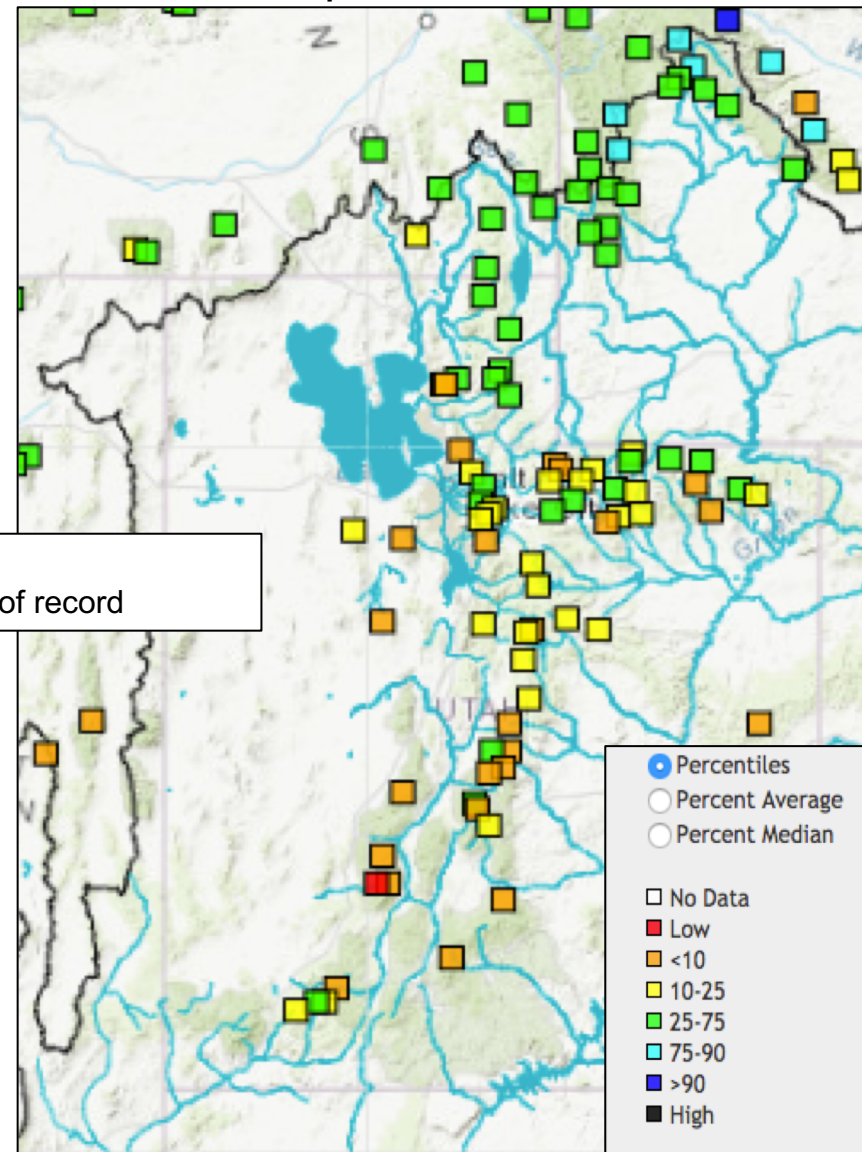
SNOTEL SWE Historical Rankings (period of record 30-40 years)

(**earliest year 1978+)

March 6, 2018



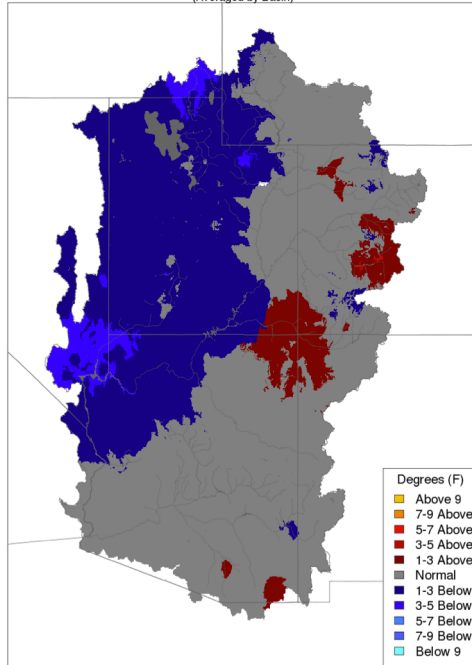
April 5, 2018



March Temperatures – Mean Monthly Maximum Deviation

2018

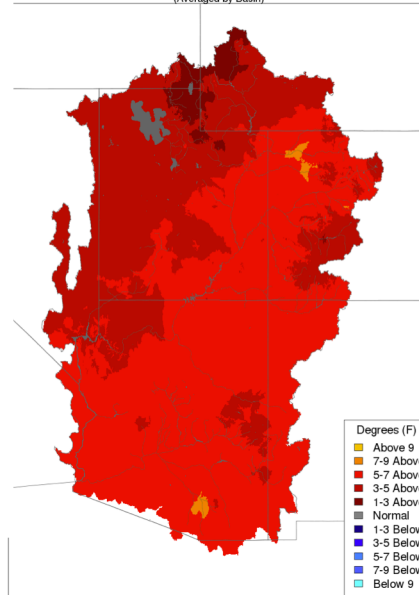
Max Temp - Monthly Deviation - March 2018
(Averaged by Basin)



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

2017

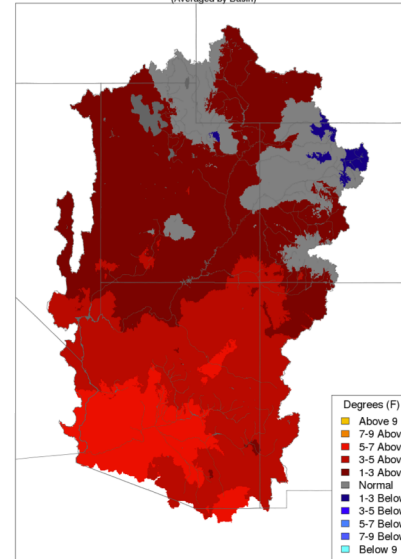
Max Temp - Monthly Deviation - March 2017
(Averaged by Basin)



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2016

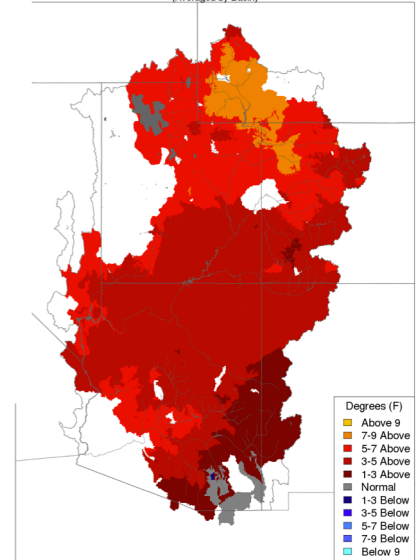
Max Temp - Monthly Deviation - March 2016
(Averaged by Basin)



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2015

Max Temp - Monthly Deviation - March 2015
(Averaged by Basin)

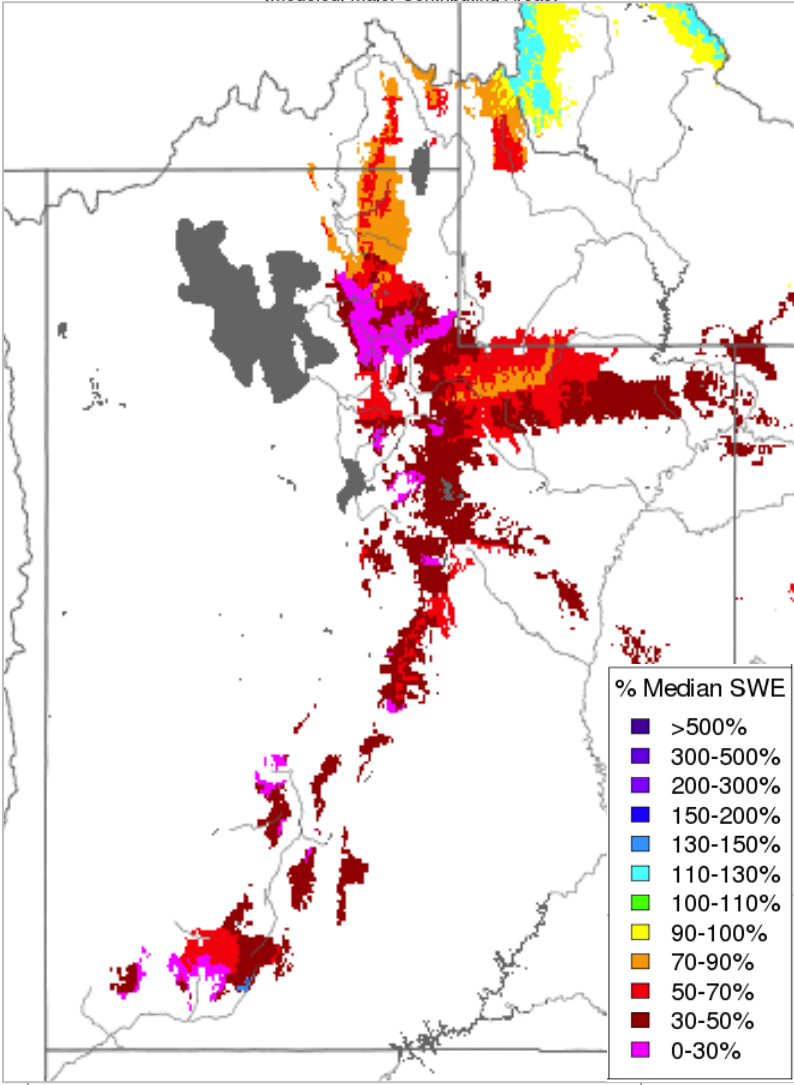


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CBRFC Model Snow Water Equivalent (% median)

Snow Conditions – March 06 2018

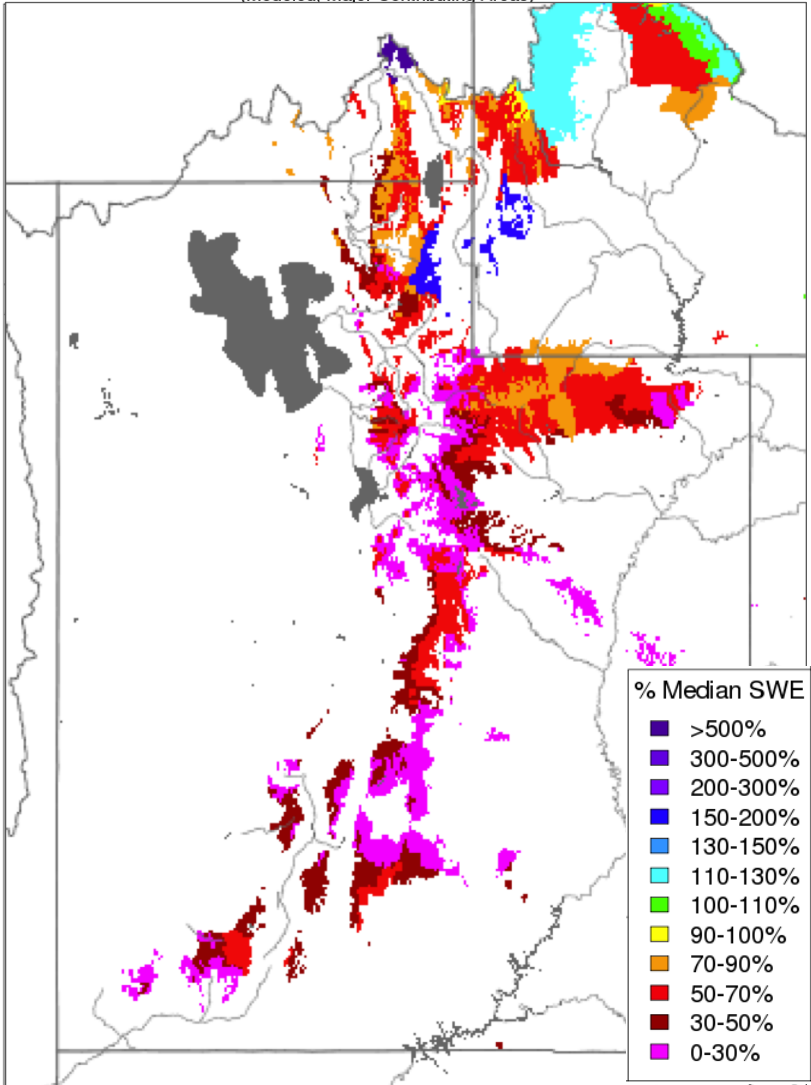
(Modeled, Major Contributing Areas)



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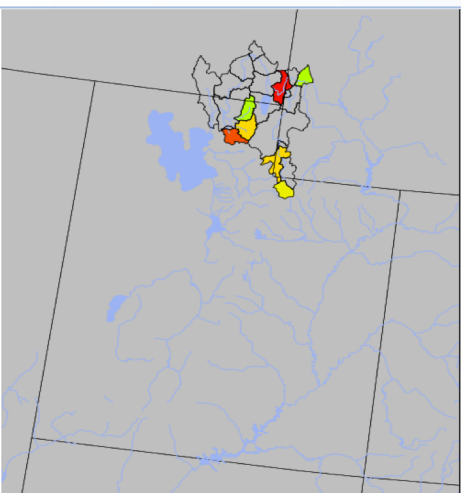
Snow Conditions – April 06 2018

(Modeled, Major Contributing Areas)

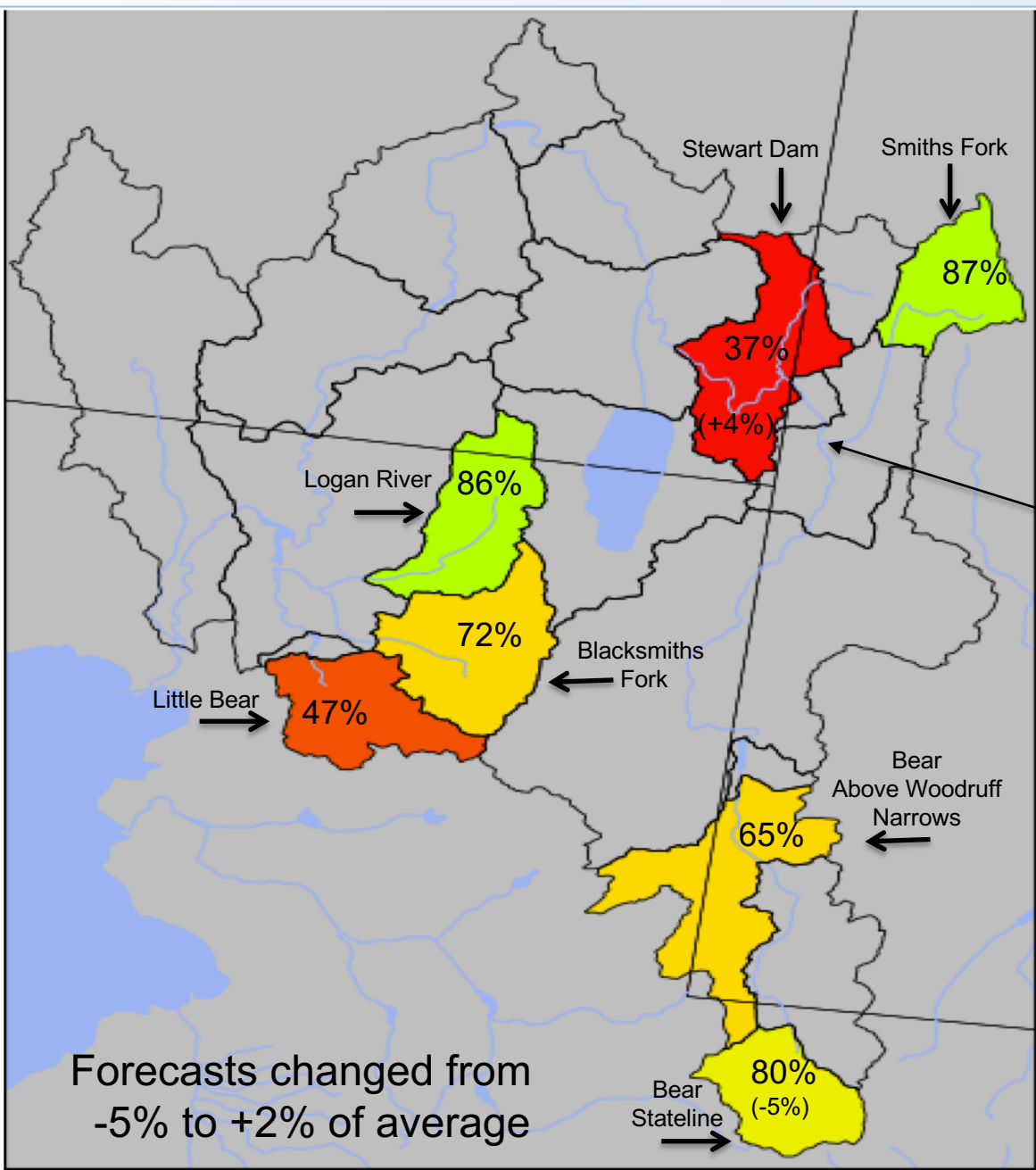
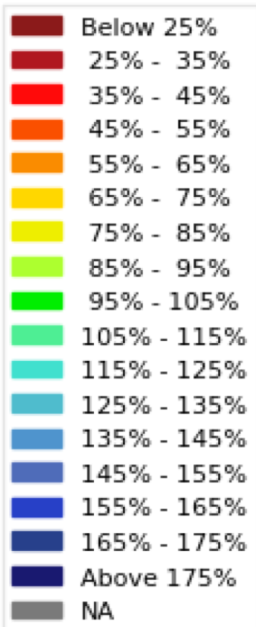


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April 1st Water Supply Forecasts – Bear River Basin



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



Median
Basin
Forecast:

Jan – 85%
Feb – 75%
Mar – 75%
Apr – 70%

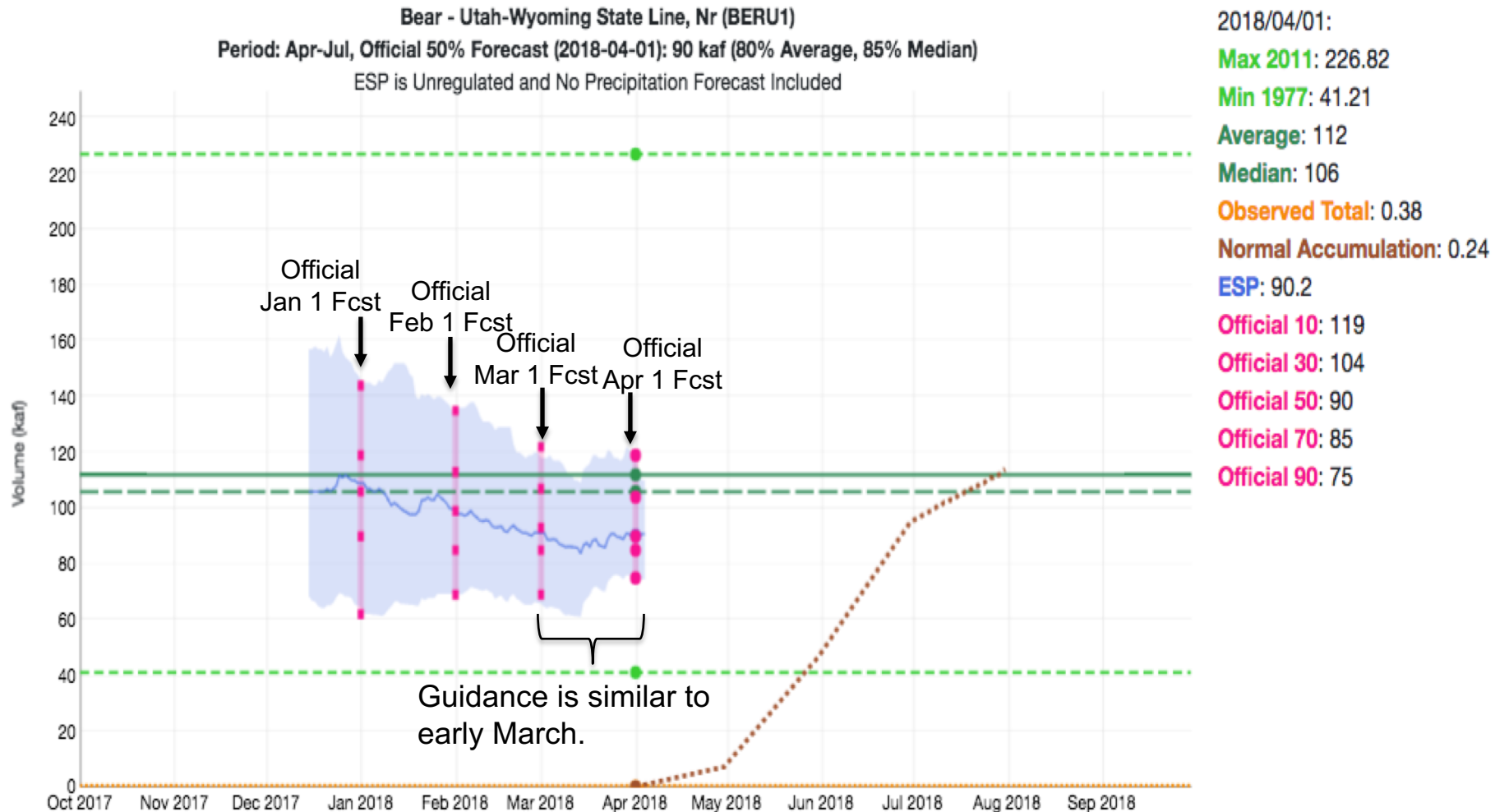
Increased

Forecasts changed from
-5% to +2% of average

Forecast Evolution Plot

Bear – UT/WY Stateline: 90 kaf / 80% average

Water Supply Forecast

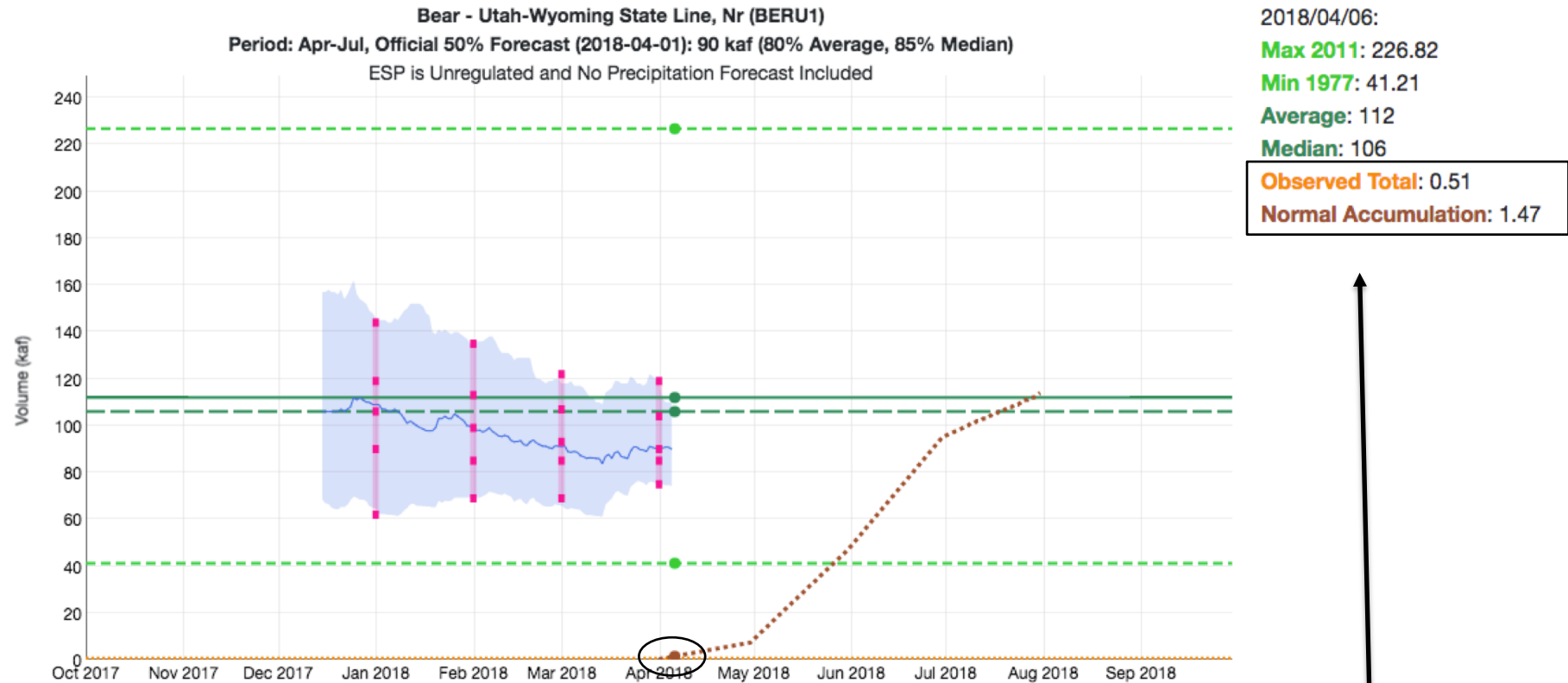


Available on CBRFC web page by selecting sites from
map: <https://www.cbrfc.noaa.gov/lmap/lmap.php?interface=wsup>
list: <https://www.cbrfc.noaa.gov/rmap/wsupsuplist.php>

Forecast Evolution Plot

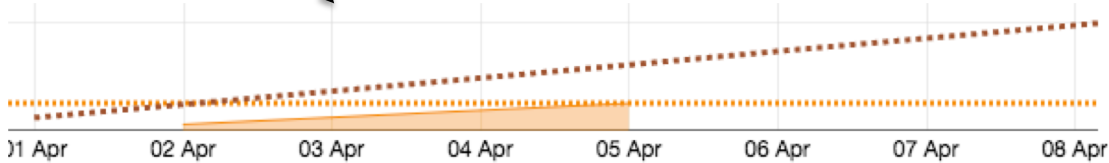
Bear – UT/WY Stateline: 90 kaf / 80% average

Water Supply Forecast



An April-July forecast on April 20th will be a combination of:

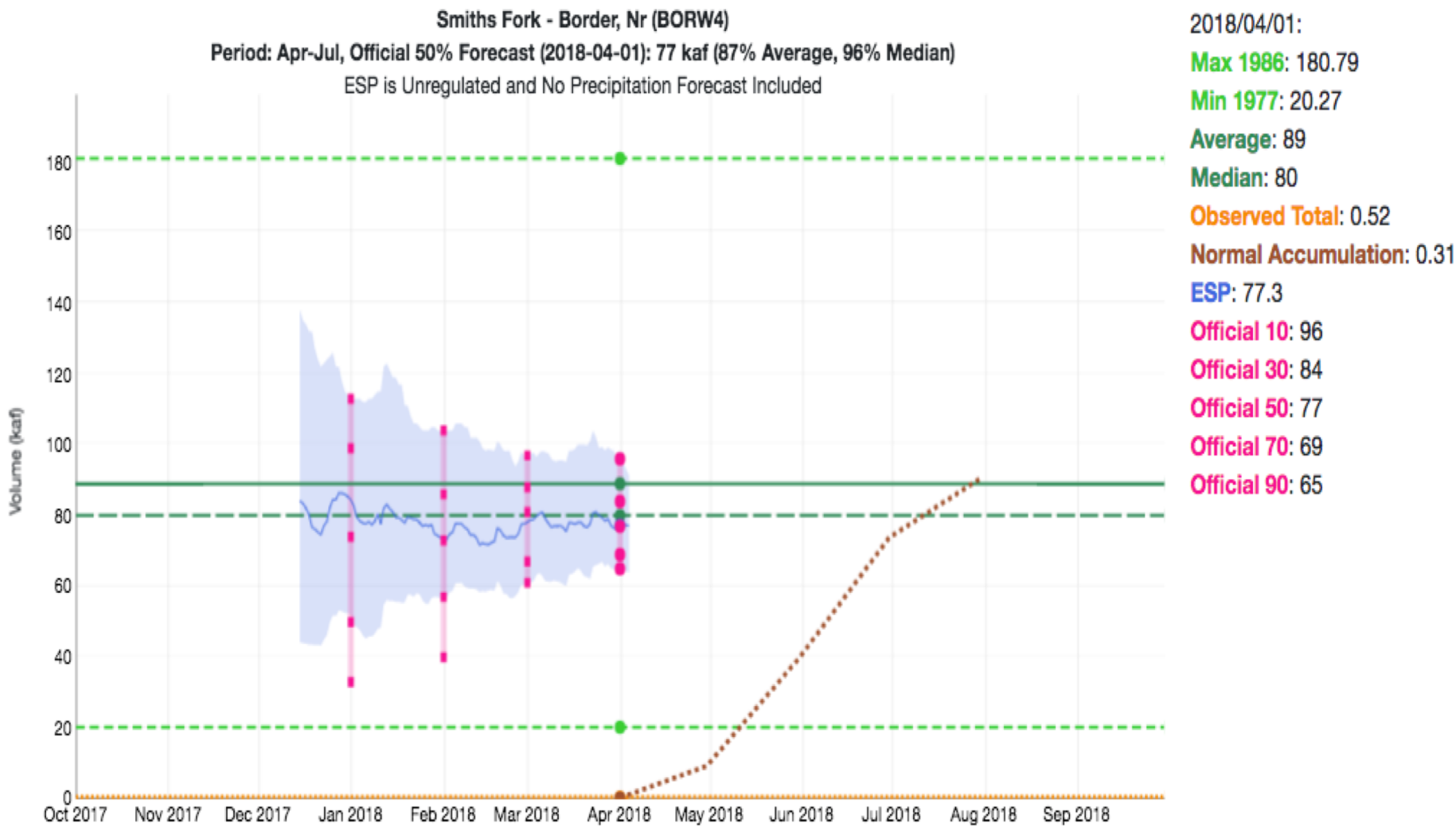
- April 1-20 observation
- April 21-July forecast



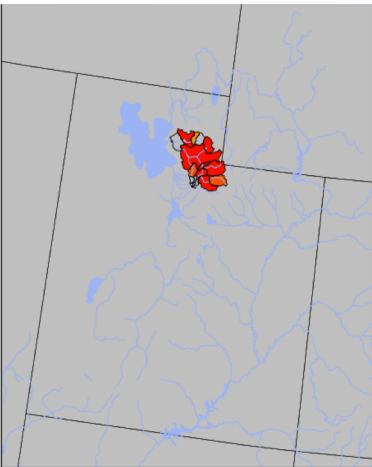
Forecast Evolution Plot

Smiths Fork – WY/ID Border – 77 kaf / 87% average

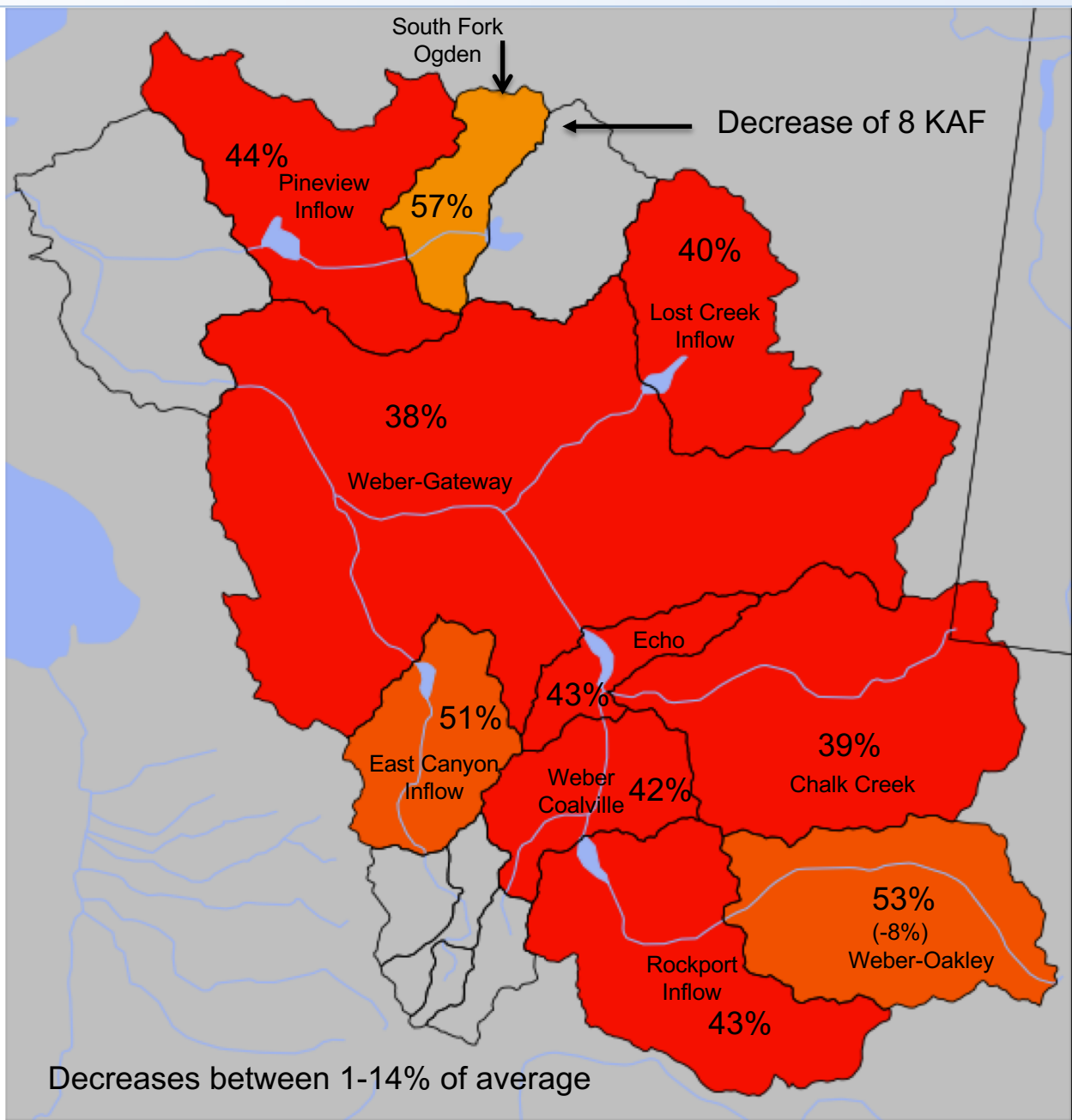
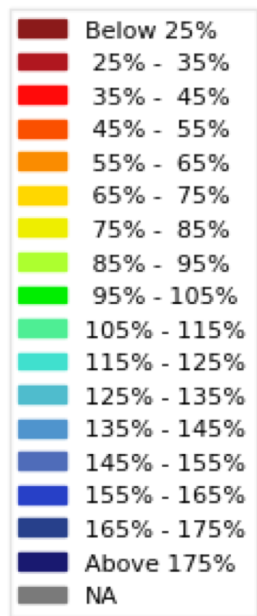
Water Supply Forecast



April 1st Water Supply Forecasts – Weber River Basin



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



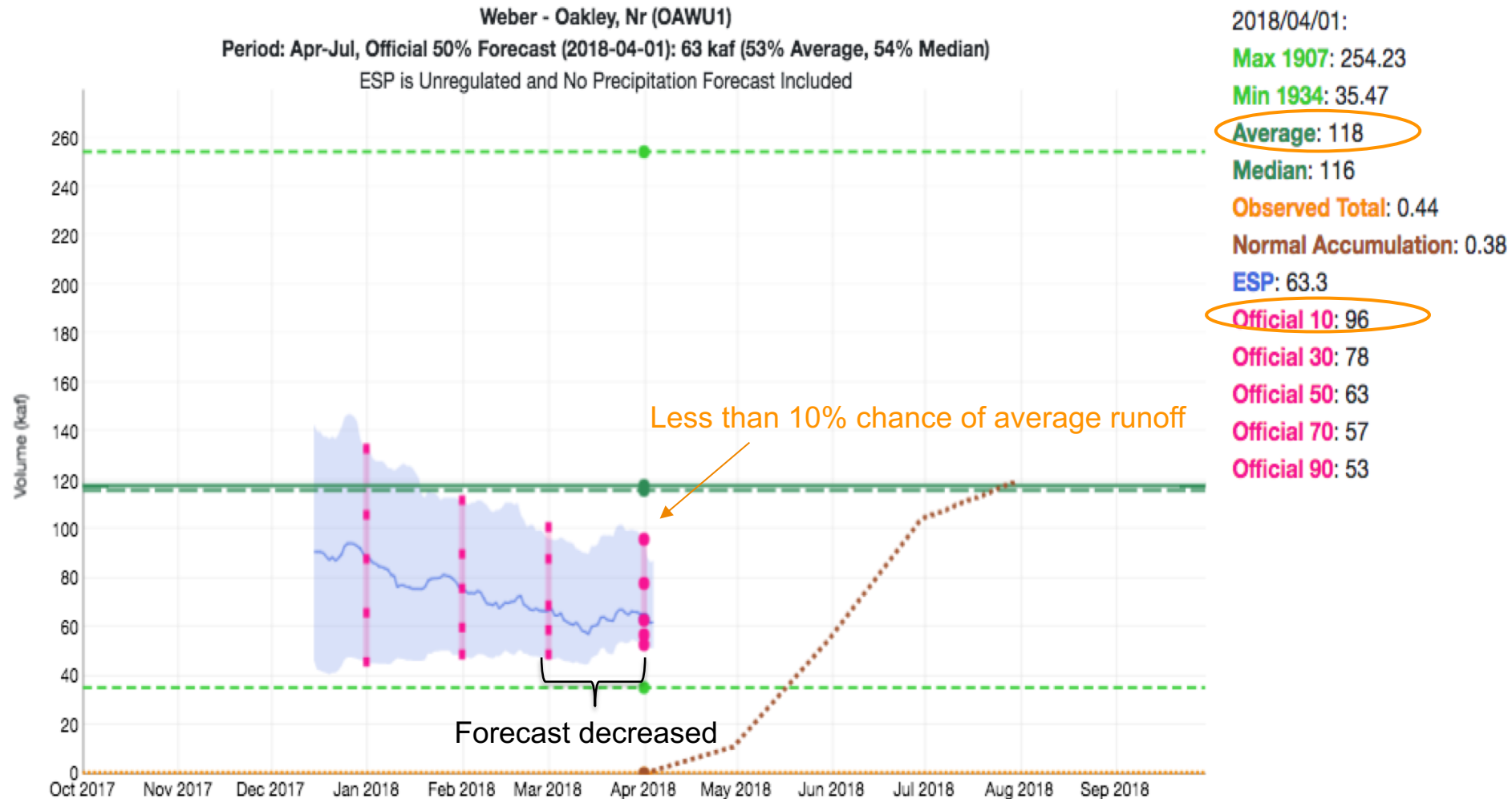
Median
Basin
Forecast:

Jan – 65%
Feb – 50%
Mar – 50%
Apr – 45%

Forecast Evolution Plot

Weber – Oakley: 63 kaf / 53% average

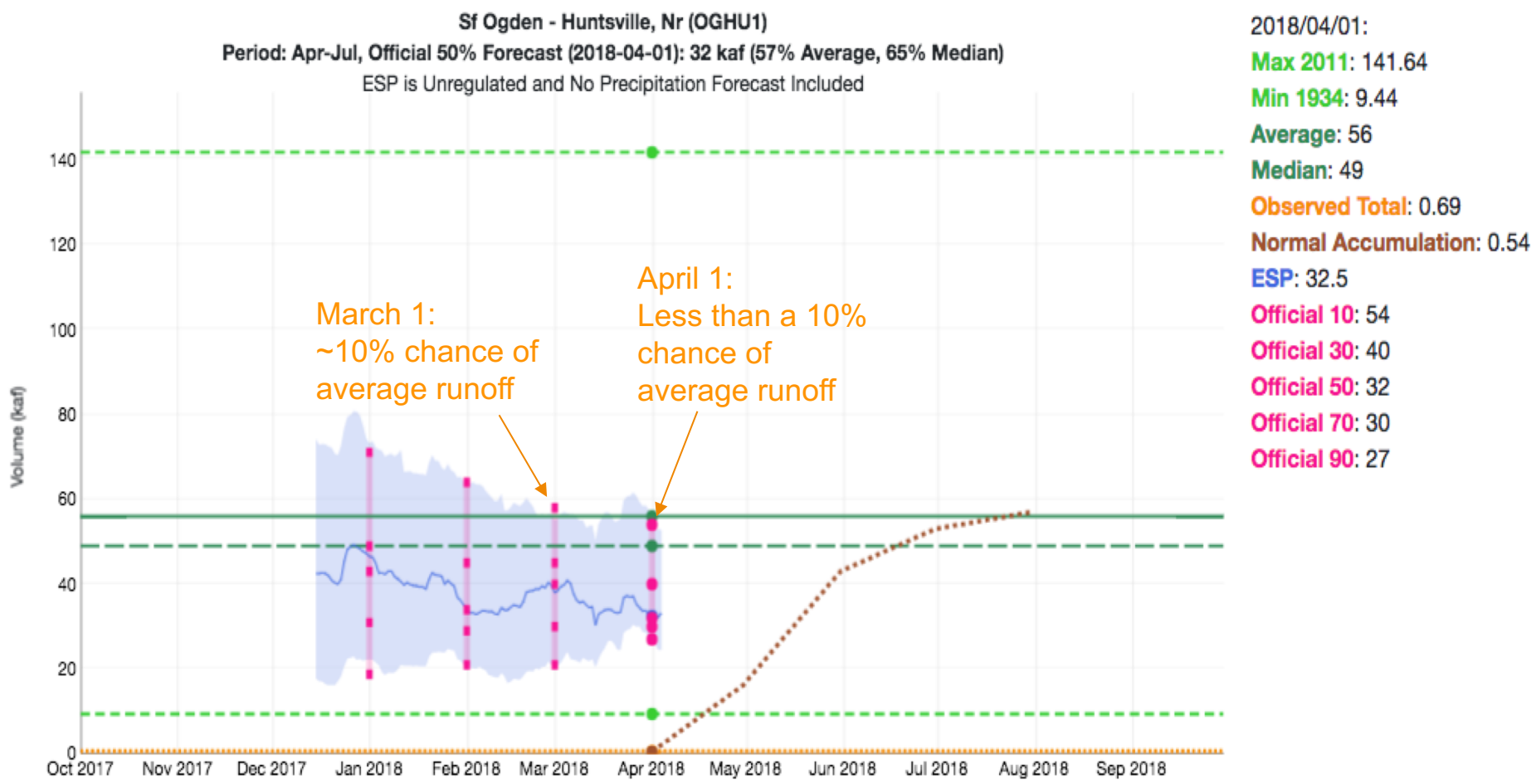
Water Supply Forecast



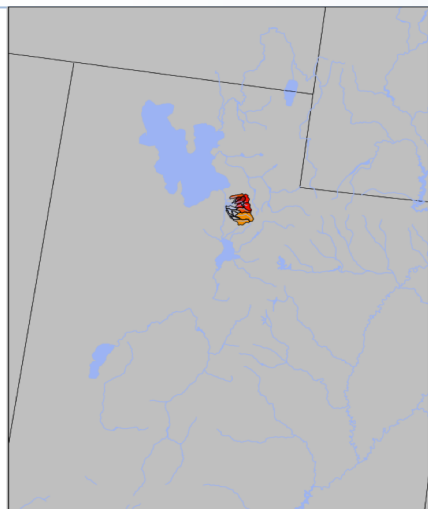
Forecast Evolution Plot

SF Ogden – Huntsville – 32 kaf / 57% average

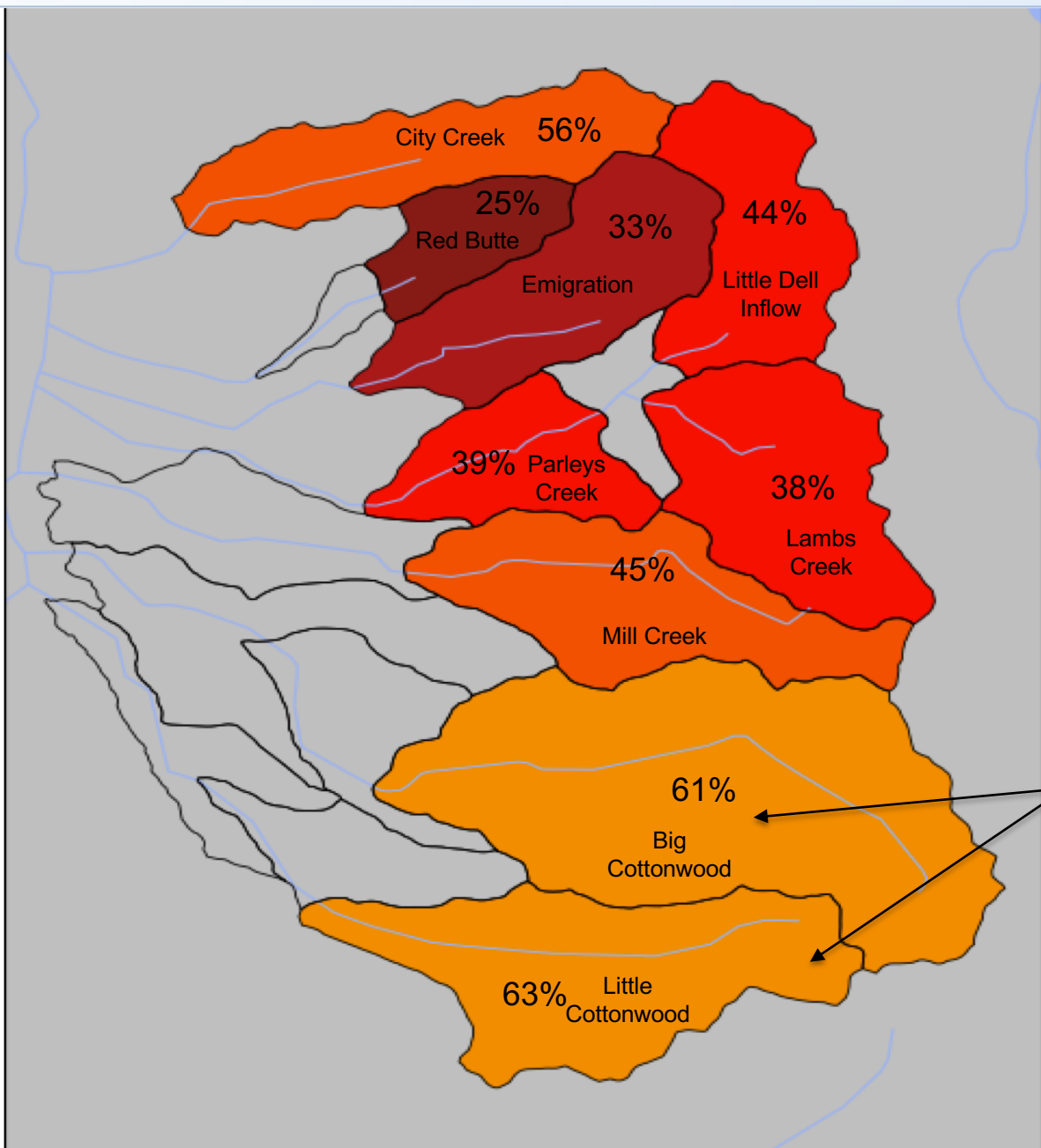
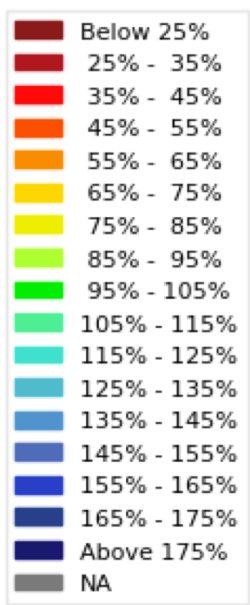
Water Supply Forecast



April 1st Water Supply Forecasts – Six Creeks



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



Median
Basin
Forecast:

Jan – 55%
Feb – 45%
Mar – 50%
Apr – 45%

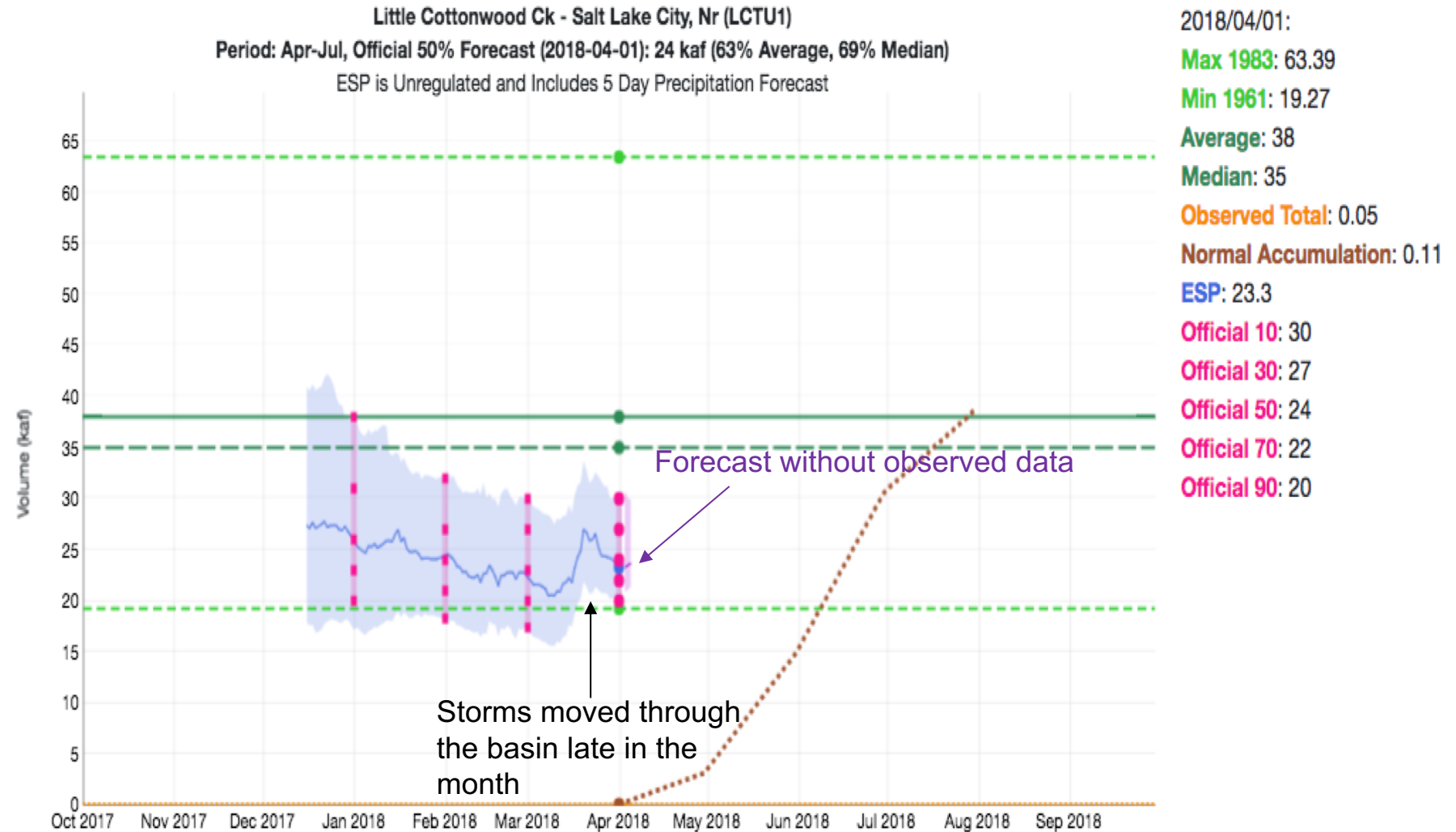
Increased
(2-3% of avg)

*Elsewhere
Decreases*
(3-10% of avg)

Forecast Evolution Plot

Little Cottonwood Creek: 24 kaf / 63% average

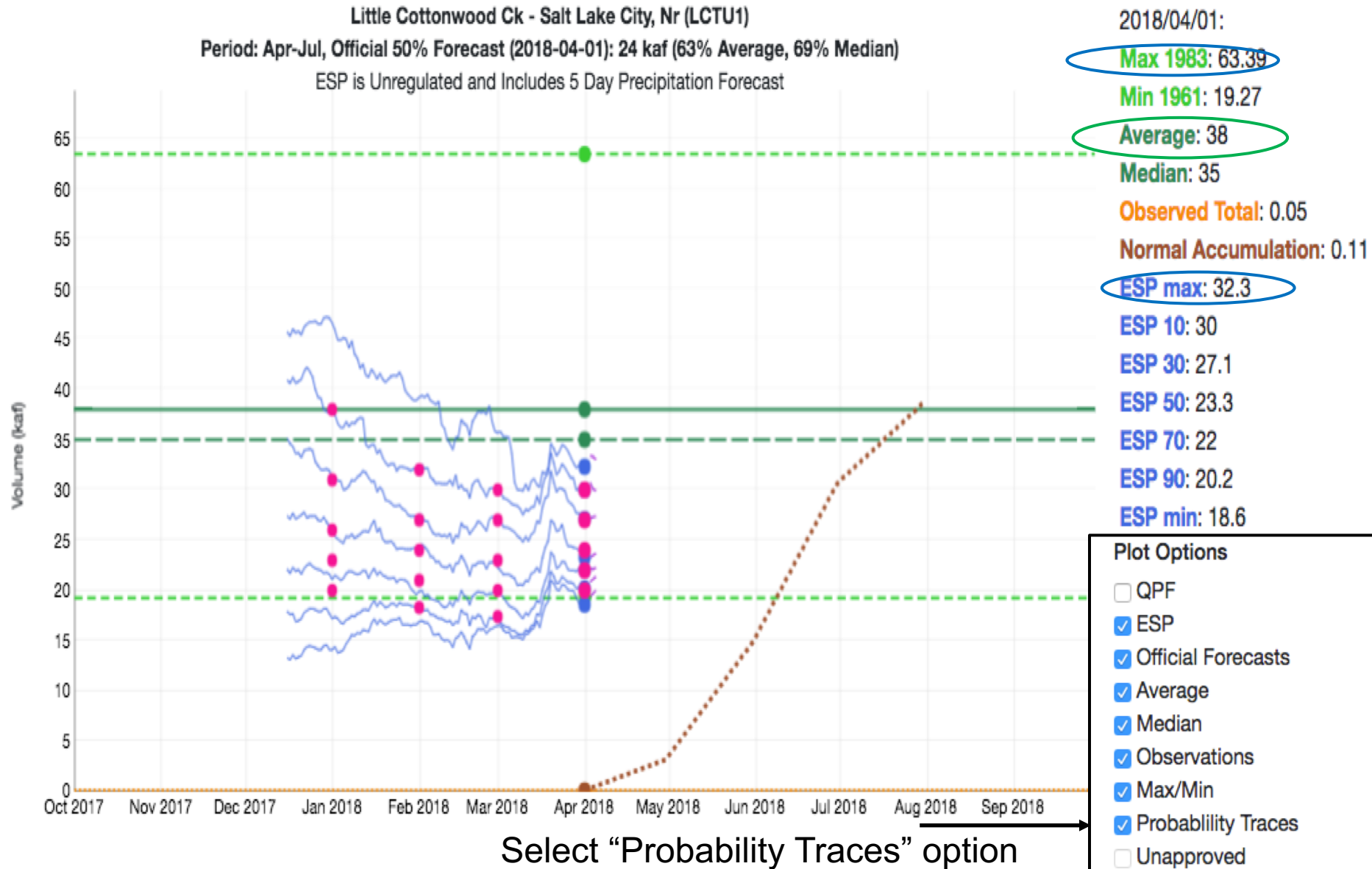
Water Supply Forecast



Forecast Evolution Plot

Little Cottonwood Creek: 23 kaf / 63% average

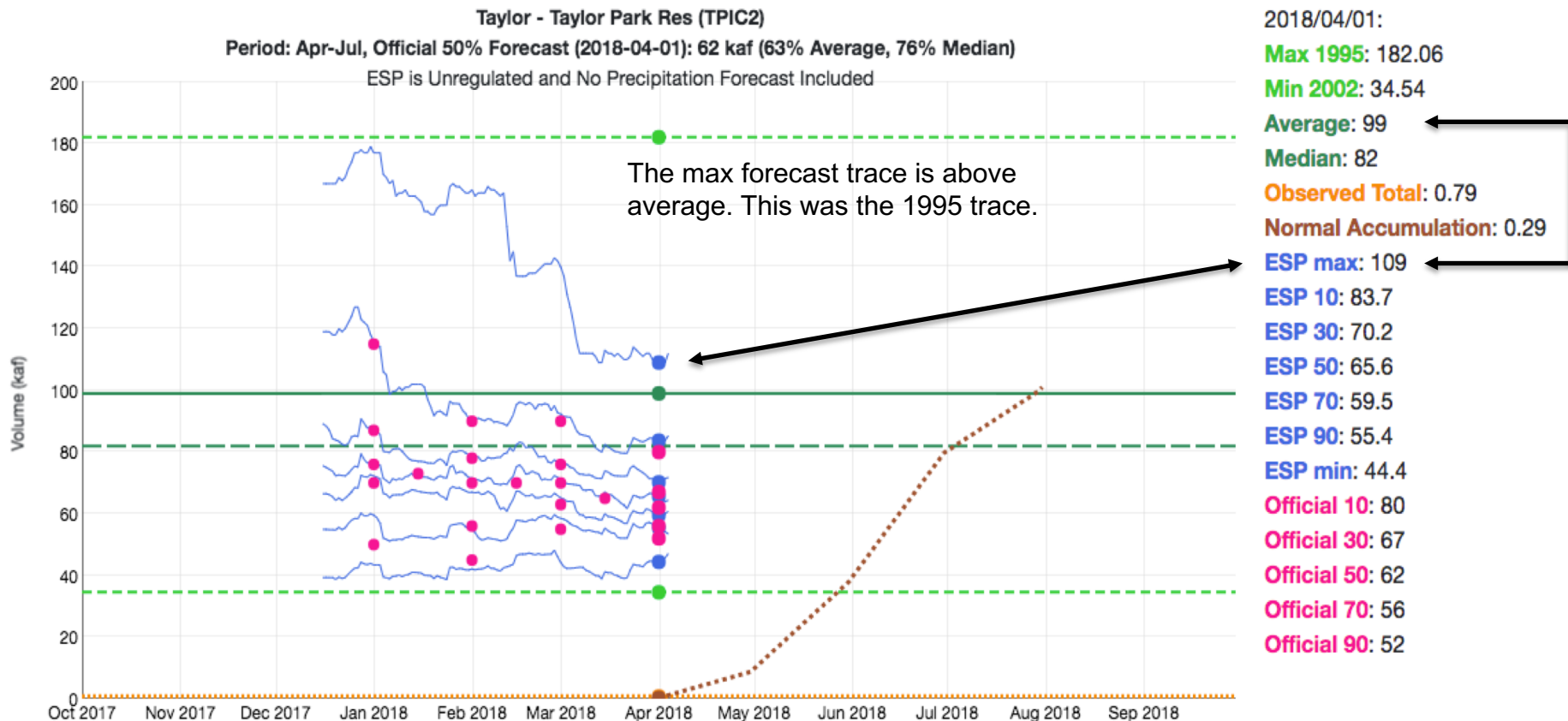
Water Supply Forecast



Lets look at a Colorado River Basin neighbor: Taylor Park Inflow

April-July Forecast 63% of average

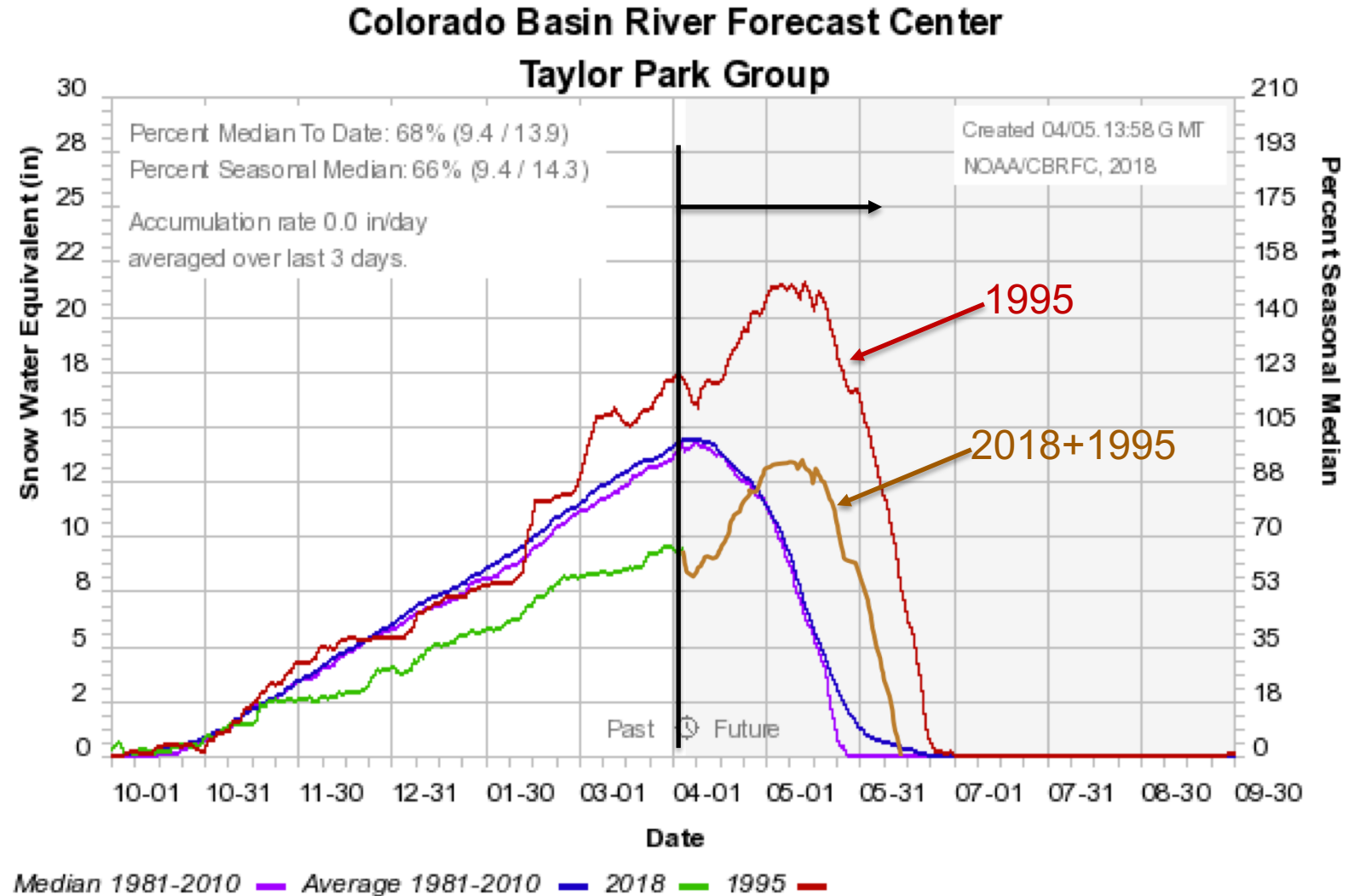
Water Supply Forecast



What this means is starting with current conditions (Streamflow, Snow, Soil Moisture) in the Taylor Park Basin, but having 1995 weather from this point forward – the model output results in a April-July volume of 109 KAF (110% of average).

The model is calibrated on the 1981-2015 period. Assuming all years are equally weighted this 1995 climate scenario would have a 1/35 (~3%) chance of occurring.

What happened in 1995 after April 1st

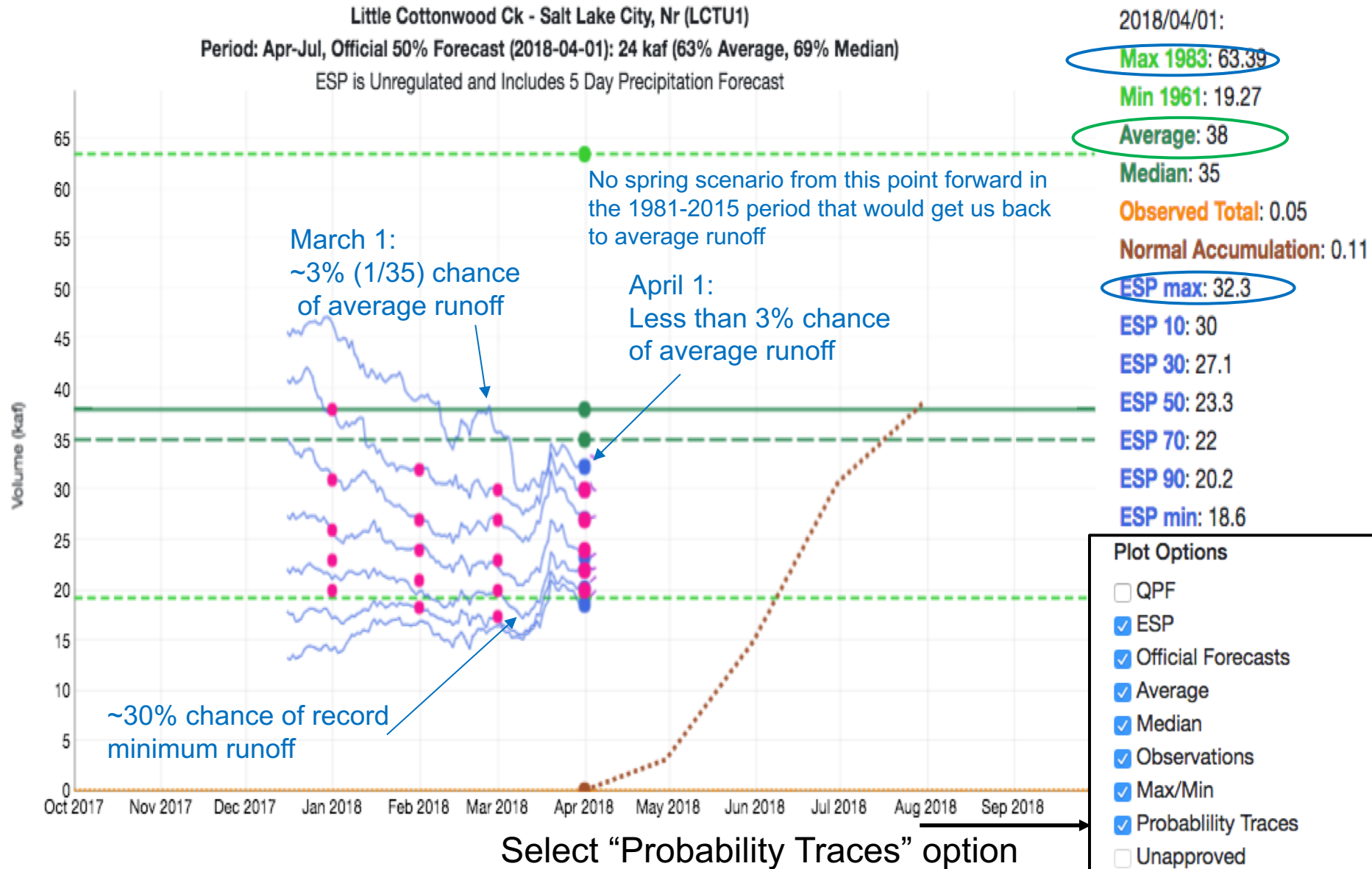


Significant snow accumulation and a late melt

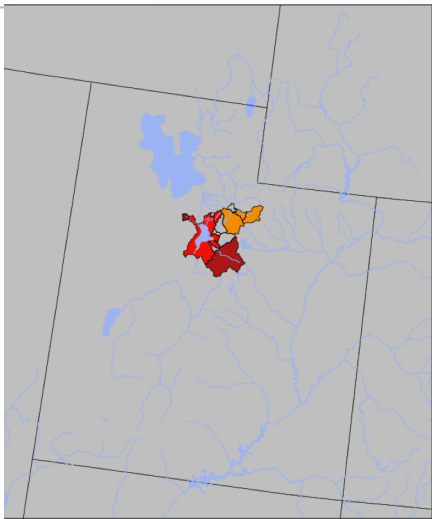
Forecast Evolution Plot

Little Cottonwood Creek: 23 kaf / 63% average

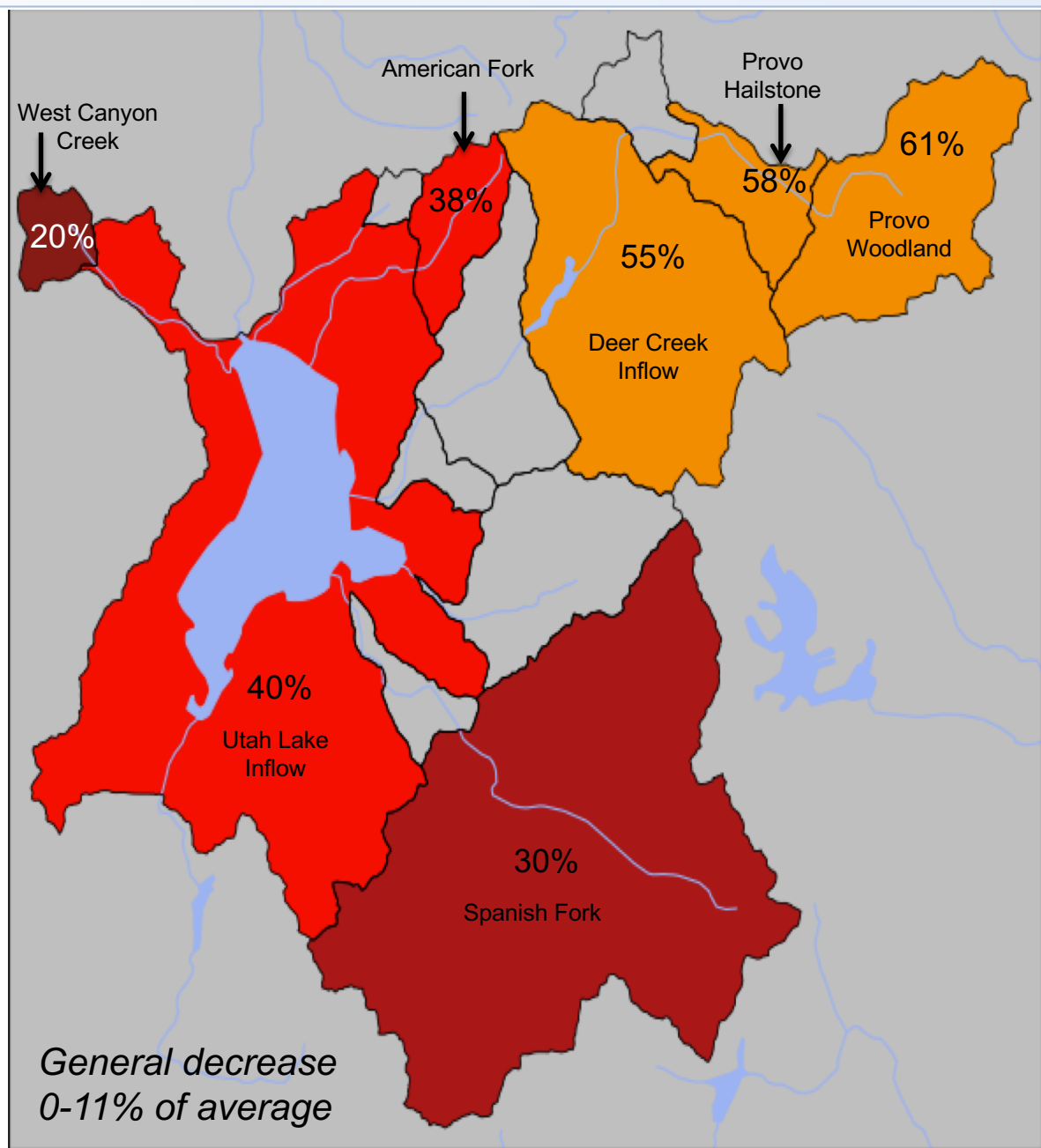
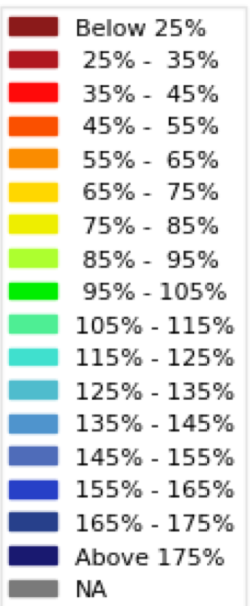
Water Supply Forecast



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



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



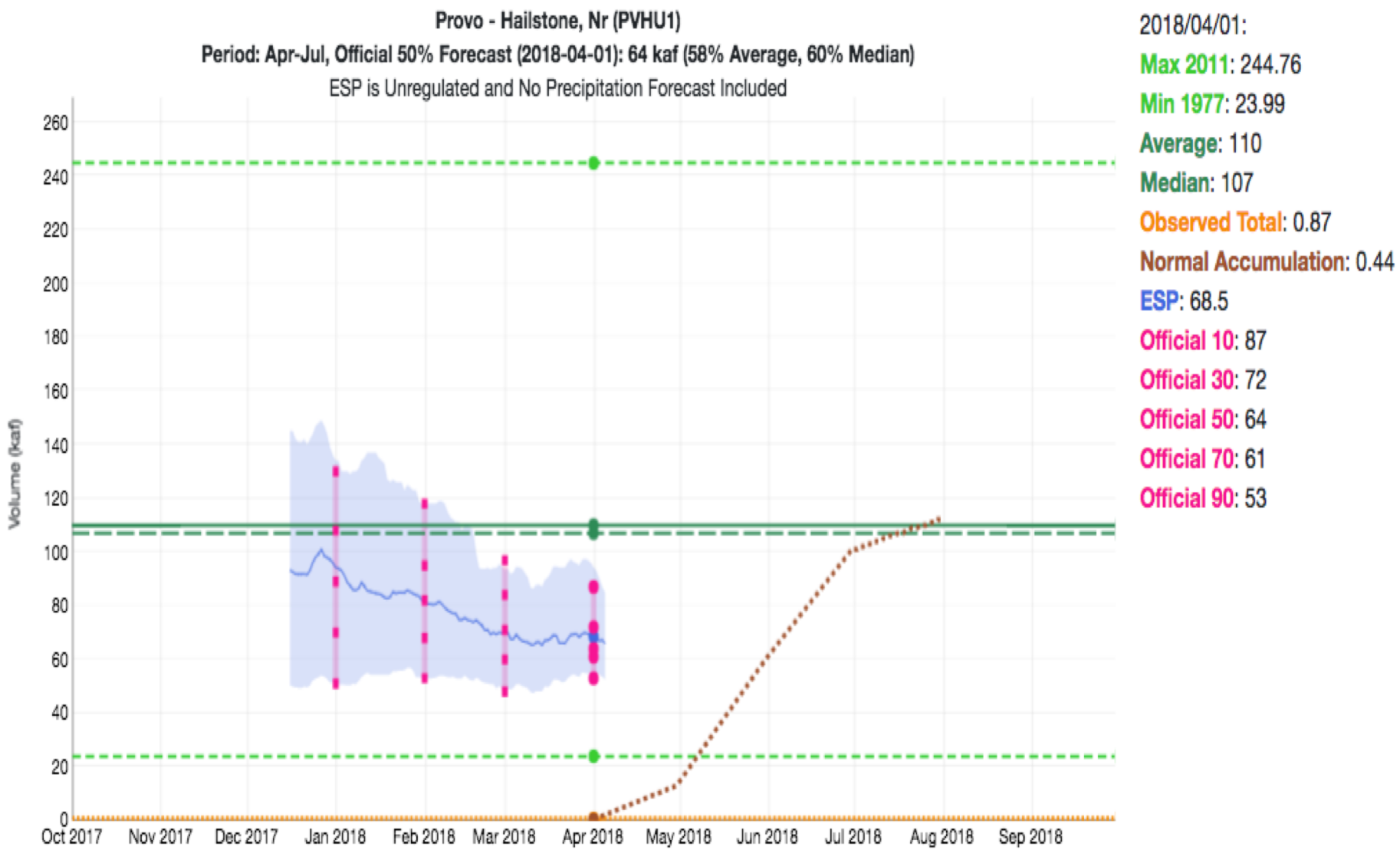
Median
Basin
Forecast:

Jan – 50%
Feb – 45%
Mar – 45%
Apr – 40%

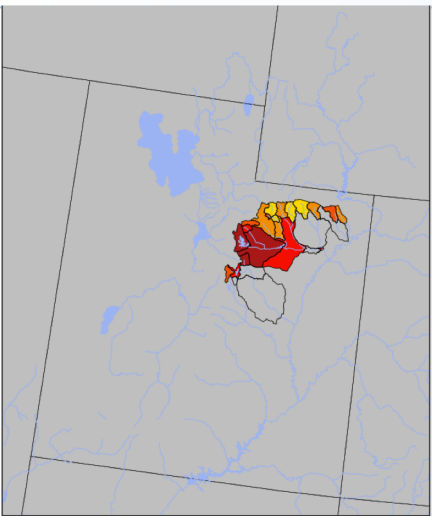
Forecast Evolution Plot

Provo – Hailstone (Jordanelle Inflow) – 64 kaf / 58% average

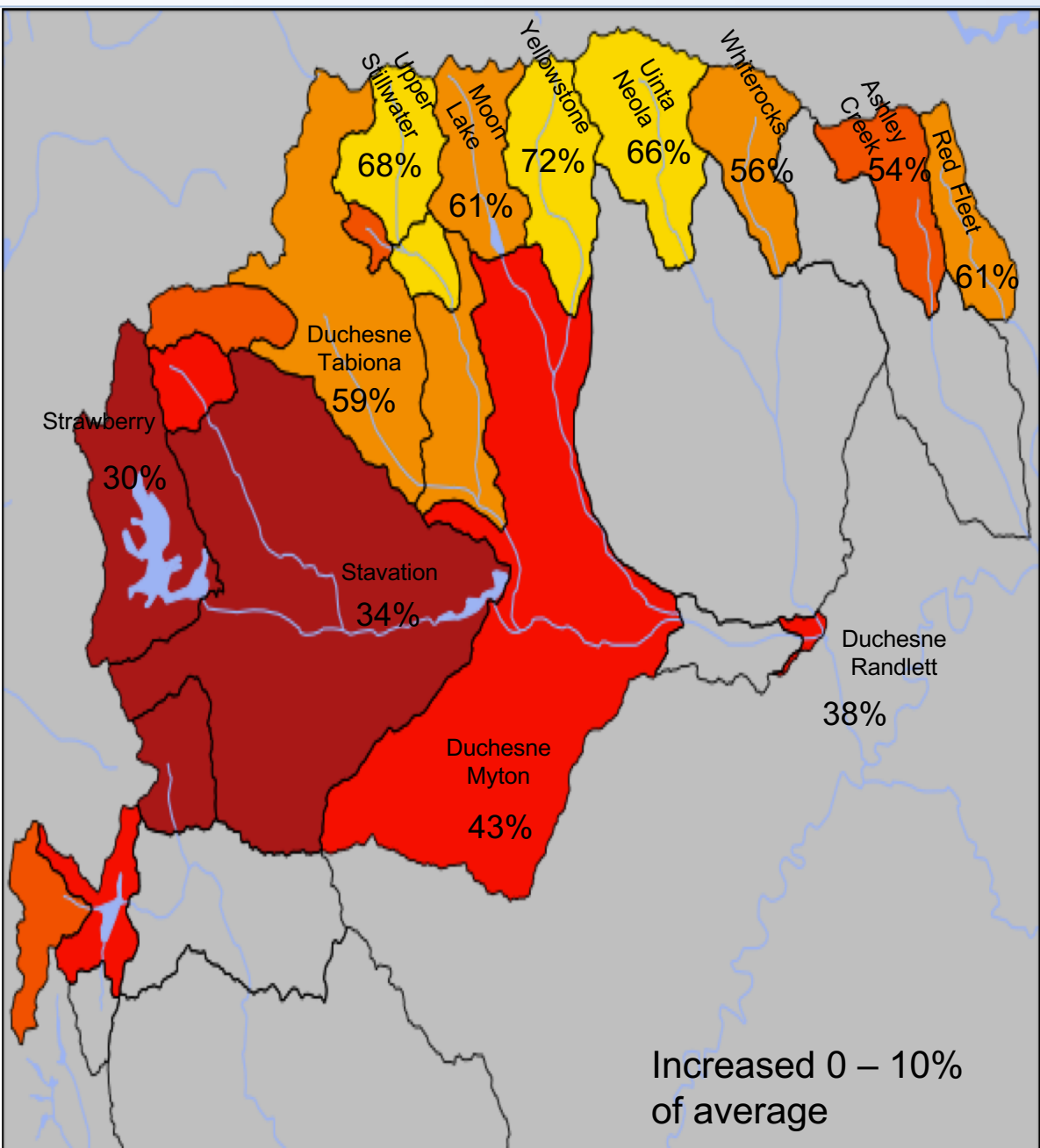
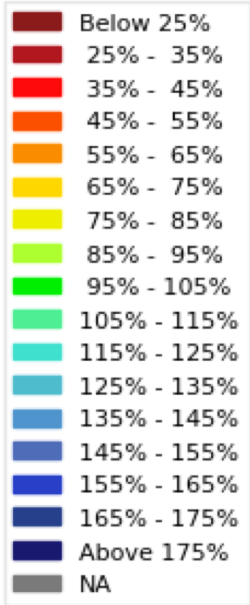
Water Supply Forecast



April 1st Water Supply Forecasts – Duchesne



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



Median
Basin
Forecast:

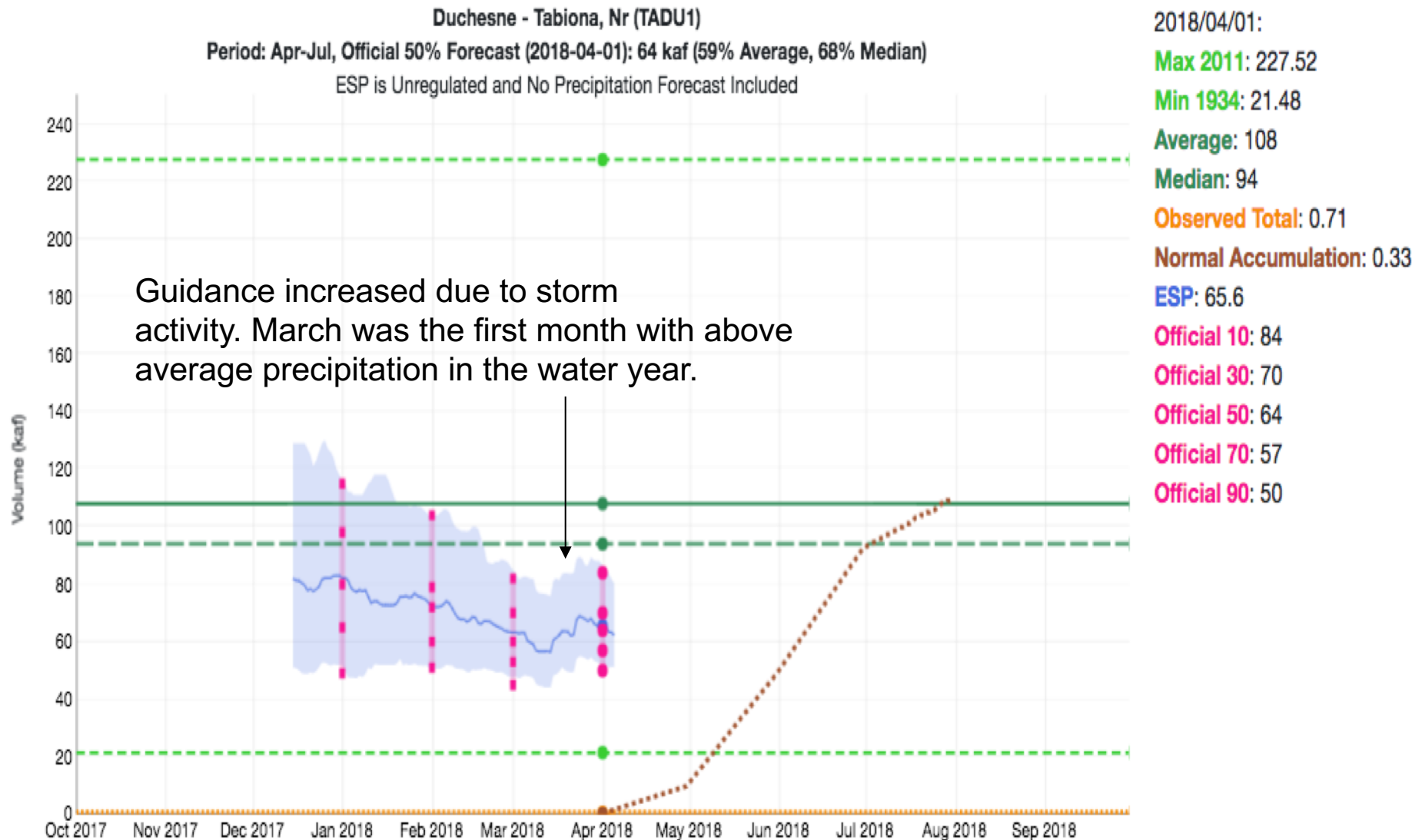
Jan – 60%
Feb – 60%
Mar – 55%
Apr - 60%

Increased 0 – 10%
of average

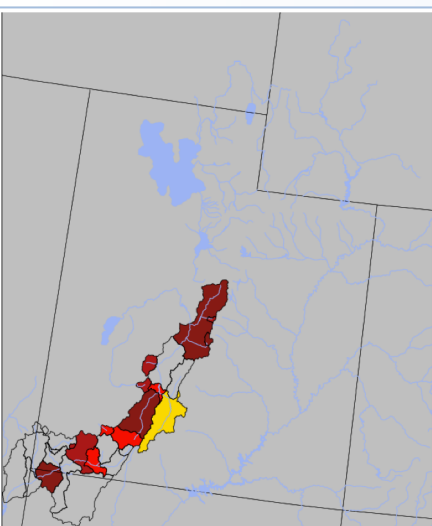
Forecast Evolution Plot

Duchesne – Tabiona – 64 kaf / 59% average

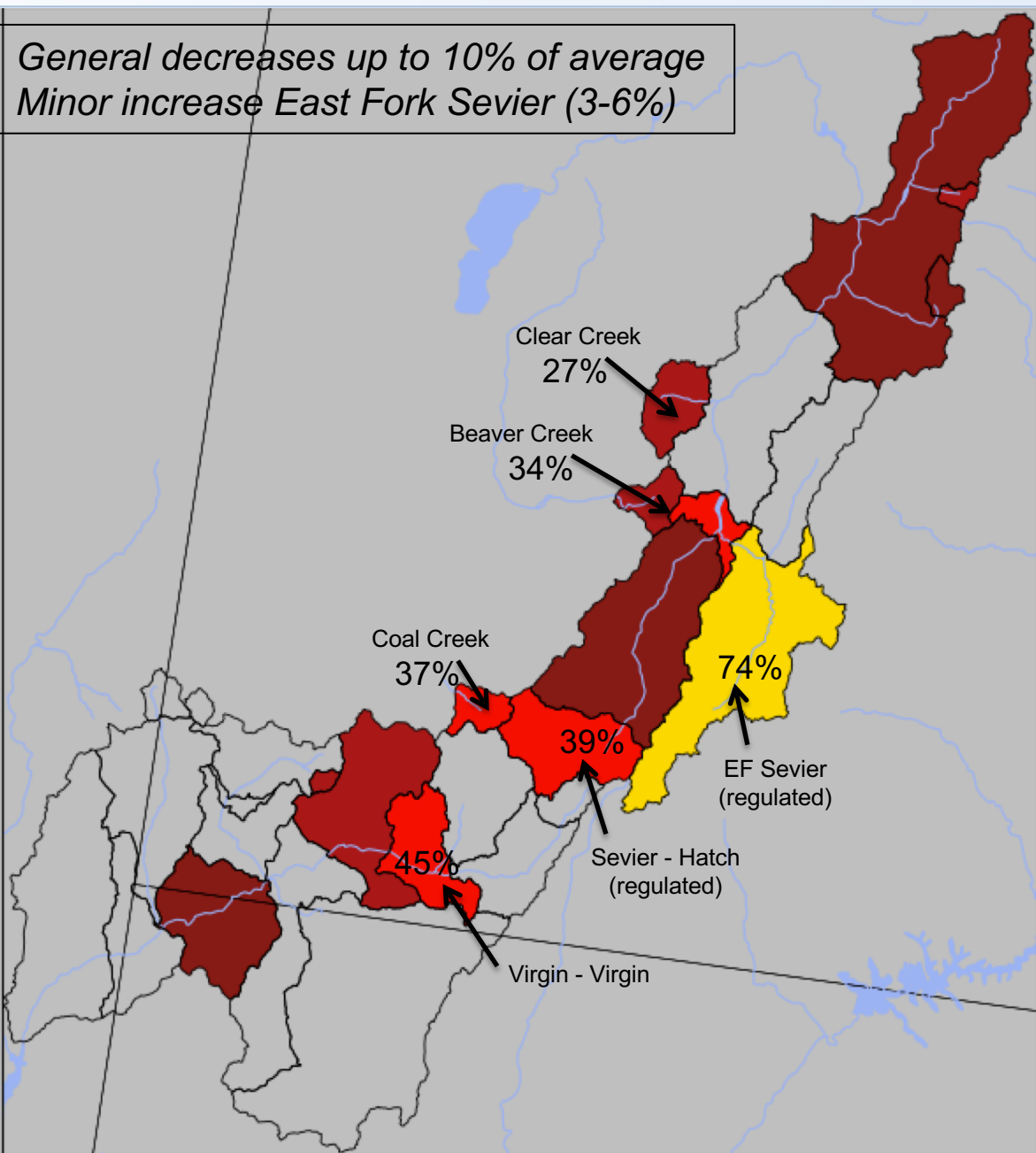
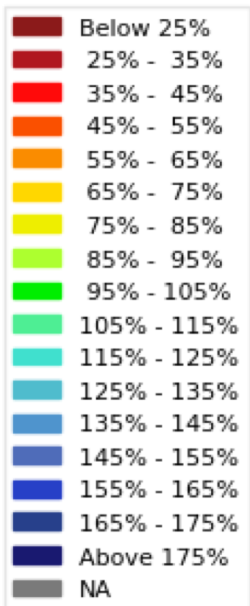
Water Supply Forecast



April 1st Water Supply Forecasts – Sevier and Virgin



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



Sevier
Median
Basin
Forecast:

Jan – 40%
Feb – 40%
Mar – 40%
Apr – 35%

Virgin
Median
Basin
Forecast:

Jan – 35%
Feb – 30%
Mar – 30%
Apr – 25%

Forecast Validation: Model error improves Mar-May

Historical Model Error 1981-2010

Generally improvement in model error through the spring

Not much improvement in June

Lack of knowledge of high elevation snow

Forecasts are better than just going with average

Where We Do Better:

Headwaters

Primarily snow melt basins

Known diversions / demands

Where We Do Worse:

Lower elevations (rain or early melt)

Downstream of diversions / irrigation

Little is known about diversions / demands

Map is available at:

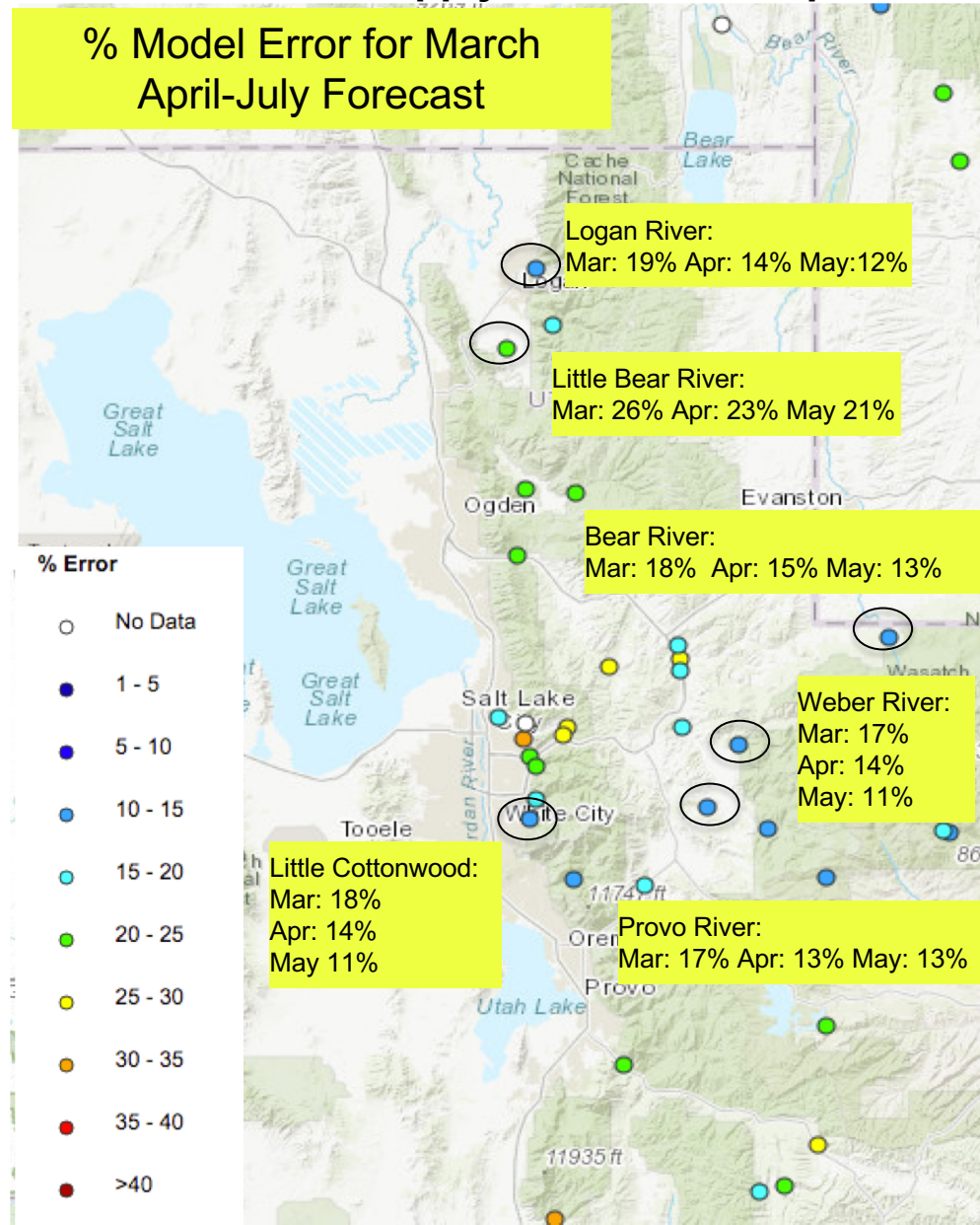
<https://www.cbrfc.noaa.gov/arc/verif/verif.php>

From Water Supply drop down menu

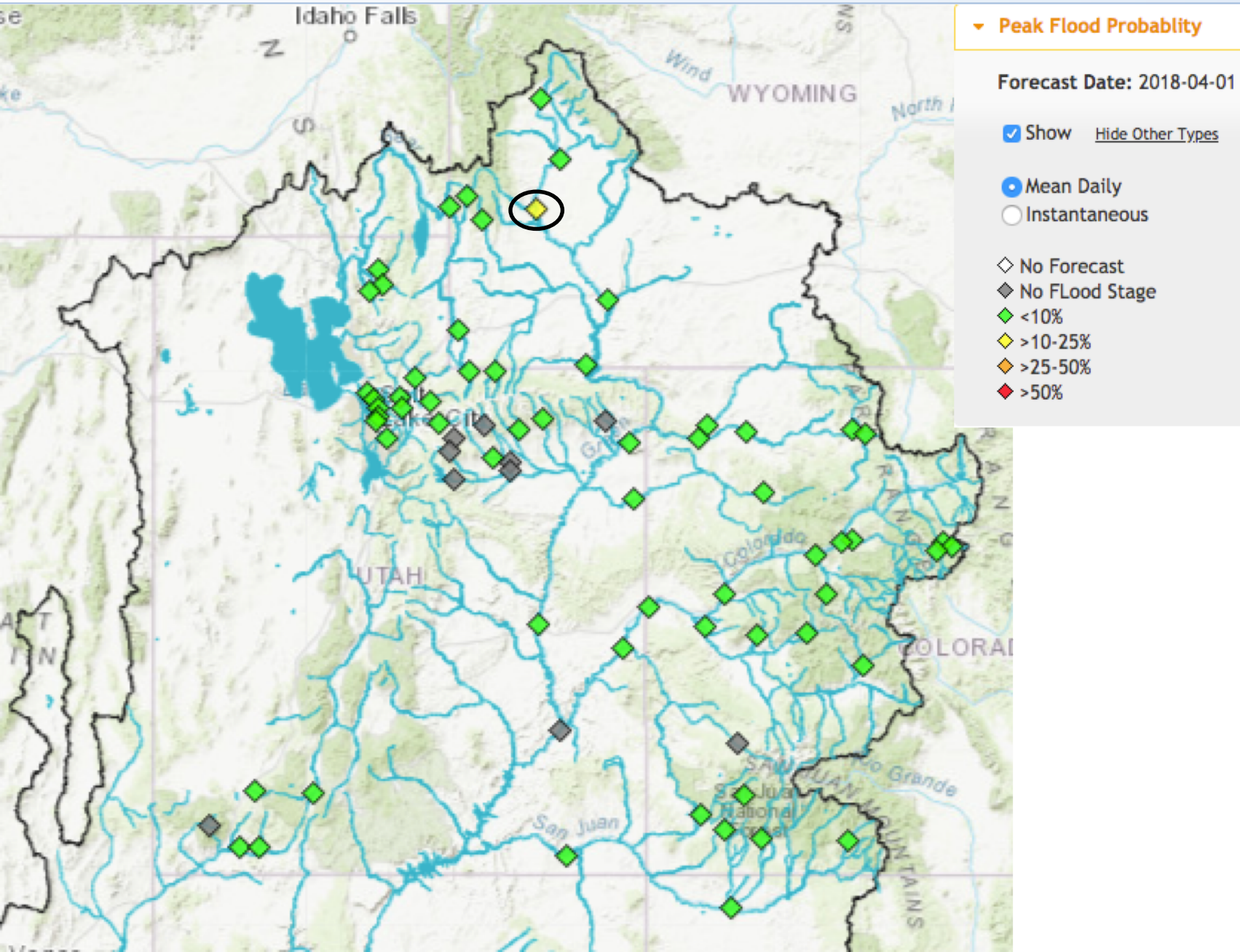
→ select Historical Verification Map

Historical Water Supply Verification - April

% Model Error for March April-July Forecast



Peak Flow Map on CBRFC website – A quick look at flood potential
(www.cbrfc.noaa.gov – select “RIVERS” drop down menu.



Peak Flow List

Peak Flow Forecast List [Help](#) | [Download Data](#) | [Requery](#) | [Rebuild Plots](#)

Peak Flood Probability Legend
◊ No Forecast ◊ No Flood Stage ◊ <10 ◊ >10 ◊ >25 ◊ >50

Options (on/off): Mean Daily Forecasts Instantaneous Forecasts Plot

Select by Area: CBRFC Green Colorado San Juan Great Sevier Virgin Low Col

Columns (on/off): ID River Location Flood Flow PI Issue Date Observed Peak to Date Observed Date Historic Peak Hist Peak Date Average Peak Normal Earliest Date Normal Latest Date Last Year Peak Last Year Date Notes Area Sub Area DS

Click column heading to sort by that data. Click ID to view point info.

	ID	River	Location	Flood Flow	PI	Issue Date	Mean Daily 90	Mean Daily 75	Mean Daily 50	Mean Daily 25	Mean Daily 10	Inst 90	Inst 75	Inst 50	Inst 25	Inst 10	Historic Peak	Average Peak	Normal Earliest Date	Normal Latest Date	Last Year Peak	Last Year Date
1	WBRW4	Green	Daniel	6100	◊	2018-03-01	2500	2700	3200	3500	4000	2600	2800	3300	3600	4100	5620	2695	05-27	06-28	5310	2017-06-20
2	BPNW4	New Fork	Big Piney	8850	◊	2018-03-01	3000	3500	4500	5000	5500	3100	3600	4600	5200	5700	9110	4730	05-26	06-23	9010	2017-06-20
3	LABW4	Green	La Barge	10900	◊	2018-03-01	6500	7000	9000	10000	11500	6700	7200	9200	10000	12000	18800	8000	05-26	06-21	15900	2017-06-12
4	GRRW4	Green	Green River	11000	◊	2018-03-01	5000	6000	8000	9500	10000	5100	6100	8100	9700	10000	15400	5790	05-05	07-08	10500	2017-06-26
5	HMFW4	Hams Fork	Frontier	1790	◊	2018-03-01	250	350	400	550	700	260	370	430	590	750	2000	710	05-09	06-06	1240	2017-05-14
6	BNRU1	Blacks Fork	Robertson	2580	◊	2018-03-01	500	700	800	1000	1300	620	860	980	1200	1600	2860	1380	05-23	06-17	1380	2017-06-06
7	HFMW4	Henrys Fork	Manila	2960	◊	2018-03-01	150	200	250	450	650	NA	NA	NA	NA	NA	3780	750	05-10	06-26	627	2017-06-07
8	STMC2	Yampa	Steamboat Springs	5930	◊	2018-03-01	1300	1700	2100	2700	3600	1600	2000	2400	3000	3900	5870	3070	05-19	06-10	2640	2017-06-08
9	ENMC2	Elk	Milner	6220	◊	2018-03-01	1500	2000	2500	3000	4500	1700	2300	2800	3400	5100	7000	3865	05-17	06-03	3960	2017-06-12
10	MBLC2	Yampa	Maybell	21200	◊	2018-03-01	4000	5000	6500	8000	10500	4200	5200	6800	8300	11000	24400	10300	05-12	06-05	7930	2017-05-16
11	LILC2	Little Snake	Lily	14700	◊	2018-03-01	1300	2000	2500	3000	4500	1500	2300	2800	3400	5100	13400	4320	05-03	06-04	2870	2017-05-16
12	YDLC2	Yampa	Deerlodge Park	20600	◊	2018-03-01	5500	7000	8500	10500	13500	5900	7400	8900	11000	14000	32300	13470	05-11	06-04	10700	2017-05-16
13	WRMC2	White	Meeker	8570	◊	2018-03-01	1100	1300	1600	1900	2500	1200	1400	1700	2100	2700	6320	3040	05-17	06-09	2300	2017-06-12

Peak Flow List

Peak Flow Forecast List [Help](#) | [Download Data](#) | [Requery](#) | [Rebuild Plots](#)

Peak Flood Probability Legend
◆ No Forecast ◆ No Flood Stage ◆ <10 ◆ >10 ◆ >25 ◆ >50

Options (on/off): [Mean Daily Forecasts](#) [Instantaneous Forecasts](#) [Plot](#)

Select by Area: [CBRFC](#) [Green](#) [Colorado](#) [San Juan](#) [Great](#) [Sevier](#) [Virgin](#) [Low Col](#)

Columns (on/off): [ID](#) [River](#) [Location](#) [Flood Flow](#) [PI](#) [Issue Date](#) [Observed Peak to Date](#) [Observed Date](#) [Historic Peak](#) [Hist Peak Date](#) [Average Peak](#) [Normal Earliest Date](#) [Normal Latest Date](#) [Last Year Peak](#) [Last Year Date](#) [Notes](#) [Area](#) [Sub Area](#) [DS](#)

Click column heading to sort by that data. Click ID to view point info.

ID	River	Location	Flood Flow	PI	Issue Date	Mean Daily 90	Mean Daily 75	Mean Daily 50	Mean Daily 25	Mean Daily 10	Inst 90	Inst 75	Inst 50	Inst 25	Inst 10	Historic Peak	Average Peak	Normal Earliest Date	Normal Latest Date	Last Year Peak	Last Year Date
1 LABW4	Green	La Barge	10900	◆	2018-03-01	6500	7000	9000	10000	11500	6700	7200	9200	10000	12000	18800	8000	05-26	06-21	15900	2017-06-12
2 TADU1	Duchesne	Tabiona	100	◆	2018-03-01	120	150	200	250	350	210	240	290	350	460	2810	925	05-14	06-12	1450	2017-06-09
3 YLLU1	Yellowstone	Altonah	200	◆	2018-03-01	300	350	500	650	800	340	410	610	810	1000	1980	950	05-22	06-16	1070	2017-06-07
4 NEUU1	Uinta			◆	2018-03-01	250	400	550	750	950	540	690	900	1100	1300	3000	1245	05-15	06-11	1030	2017-06-07
5 JESU1	Green	Jensen	24100	◆	2018-03-01	9500	11000	12500	16000							16990		05-11	06-07	17900	2017-06-10
6 GRVU1	Green	Green River	36400	◆	2018-03-01	10000	11500	13000	17000							21700		05-16	06-11	21800	2017-06-11
7 WBRW4	Green	Daniel	6100	◆	2018-03-01	2500	2700	3200	3500	4000	2600	2800	3300	3600	4100	5620	2695	05-27	06-28	5310	2017-06-20
8 BPNW4	New Fork	Big Piney	8850	◆	2018-03-01	3000	3500	4500	5000	5500	3100	3600	4600	5200	5700	9110	4730	05-26	06-23	9010	2017-06-20
9 GRRW4	Green	Green River	11000	◆	2018-03-01	5000	6000	8000	9500	10000	5100	6100	8100	9700	10000	15400	5790	05-05	07-08	10500	2017-06-26
10 HMFV4	Hams Fork	Frontier	1790	◆	2018-03-01	250	350	400	550	700	260	370	430	590	750	2000	710	05-09	06-06	1240	2017-05-14
11 BNRU1	Blacks Fork	Robertson	2580	◆	2018-03-01	500	700	800	1000	1300	620	860	980	1200	1600	2860	1380	05-23	06-17	1380	2017-06-06
12 HFMW4	Henrys Fork	Manila	2960	◆	2018-03-01	150	200	250	450	650	NA	NA	NA	NA	NA	3780	750	05-10	06-26	627	2017-06-07
13 STMC2	Yampa	Steamboat Springs	5930	◆	2018-03-01	1300	1700	2100	2700	3600	1600	2000	2400	3000	3900	5870	3070	05-19	06-10	2640	2017-06-08
14 ENMC2	Elk	Milner	6220	◆	2018-03-01	1500	2000	2500	3000	4500	1700	2300	2800	3400	5100	7000	3865	05-17	06-03	3960	2017-06-12

flood level

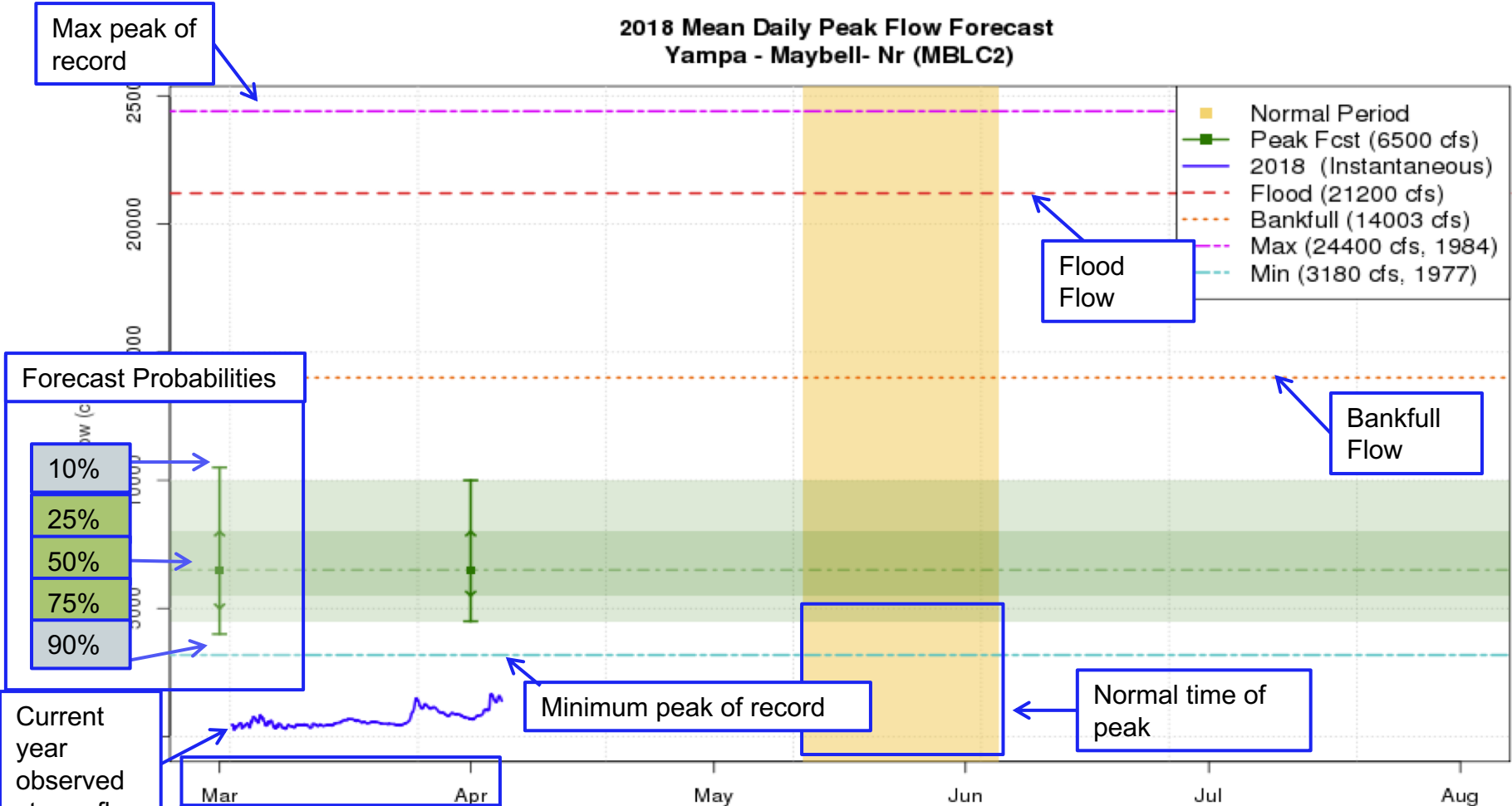
10% or greater mean daily forecast exceeds flood level

Peak Flow Graphic

MBLC2 Peak Flow Forecasts

Mean Daily Plot Instantaneous Plot **Forecasts** Observations Help

Plot Options (on/off): Record Year Data Yearly Peaks **Flood Flow**



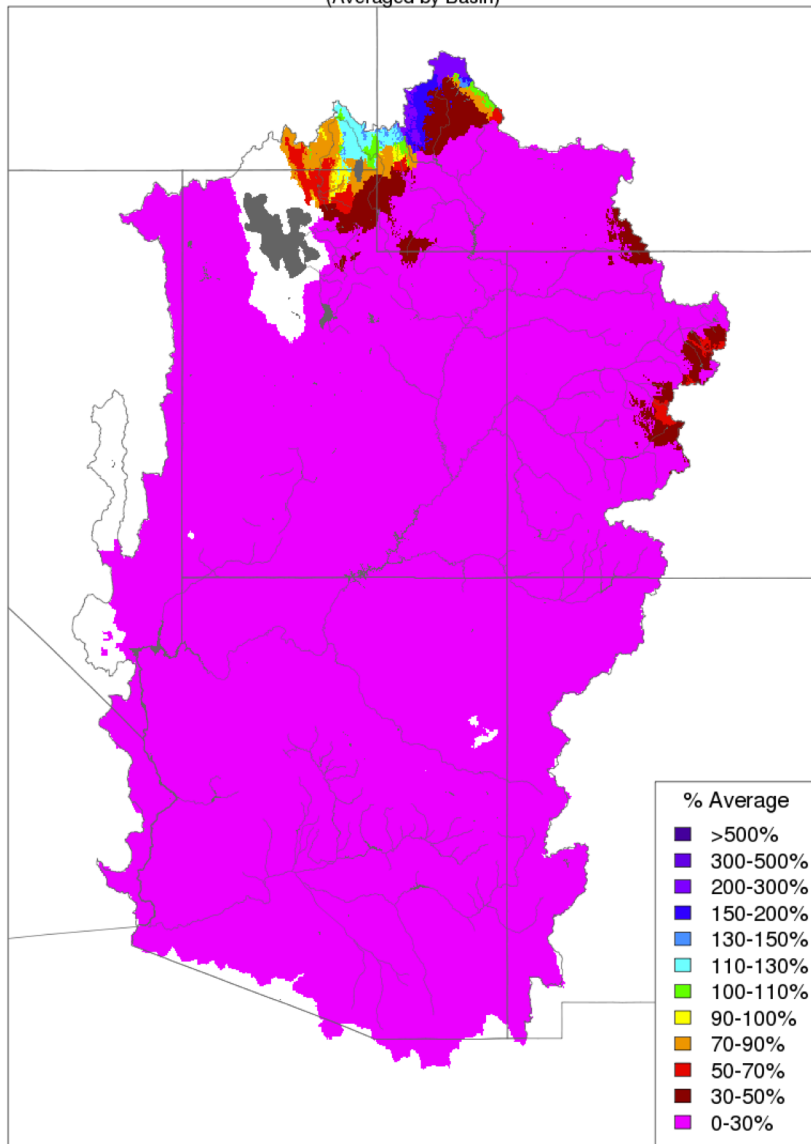
Forecasts are updated approximately every two weeks between 3/1 and 5/1

How are forecasts trending?

April Precipitation to Date – Dry but conditions are changing

Month to Date Precipitation - April 06 2018

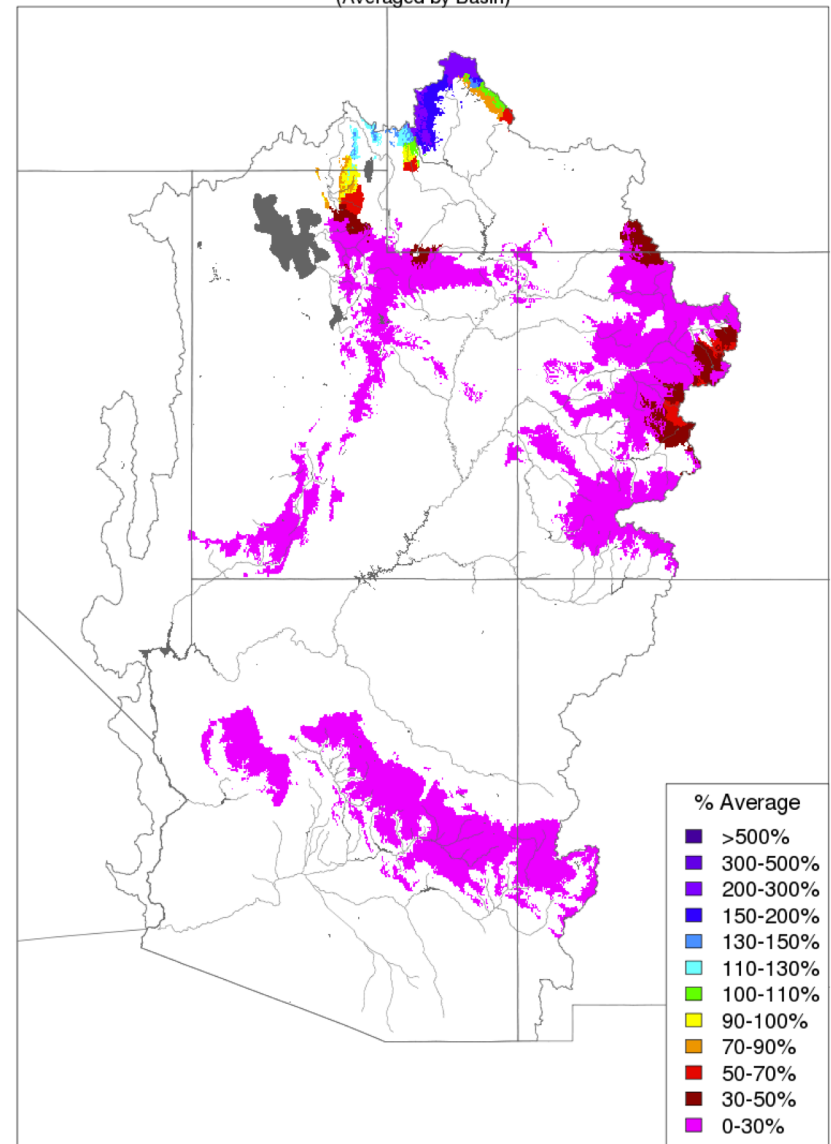
(Averaged by Basin)



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

Month to Date Precipitation - April 06 2018

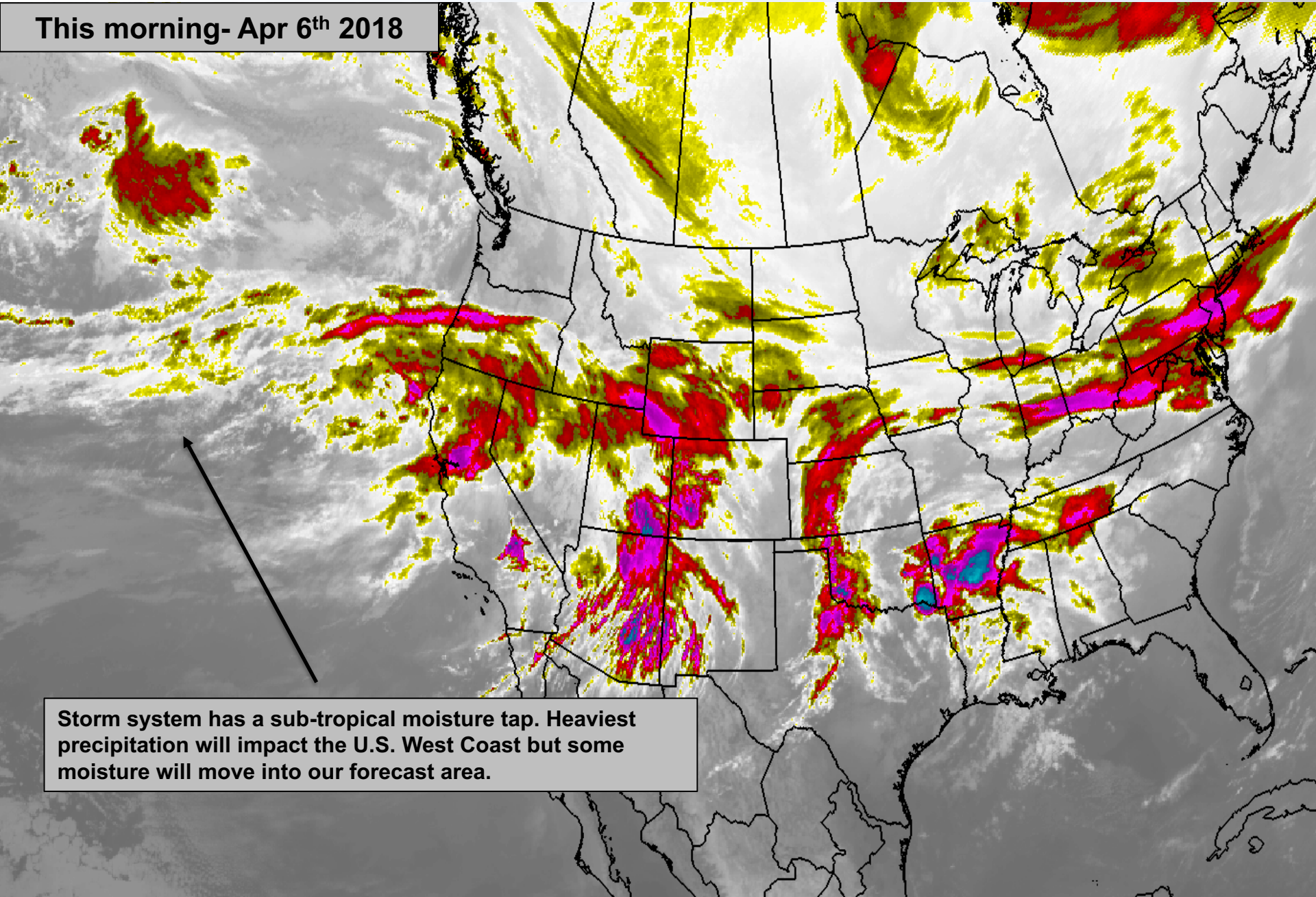
(Averaged by Basin)



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

Current and Future weather – Storm system moving in for the weekend. Sub-tropical source means mild air, high freezing levels, rain possible up to 10K feet or higher.

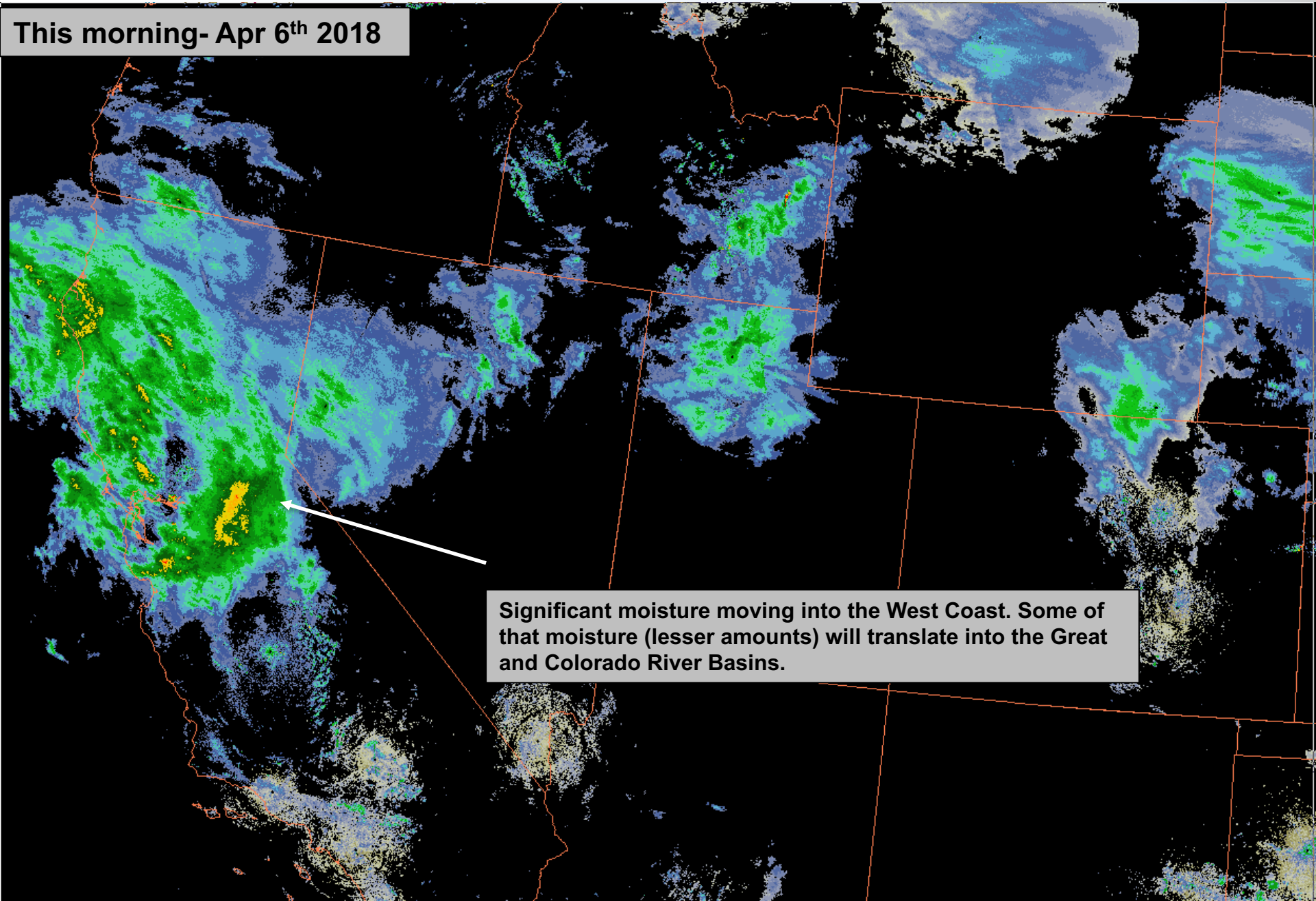
This morning- Apr 6th 2018



Storm system has a sub-tropical moisture tap. Heaviest precipitation will impact the U.S. West Coast but some moisture will move into our forecast area.

Current and Future weather – Storm system moving in for the weekend. NWS radar image from this morning.

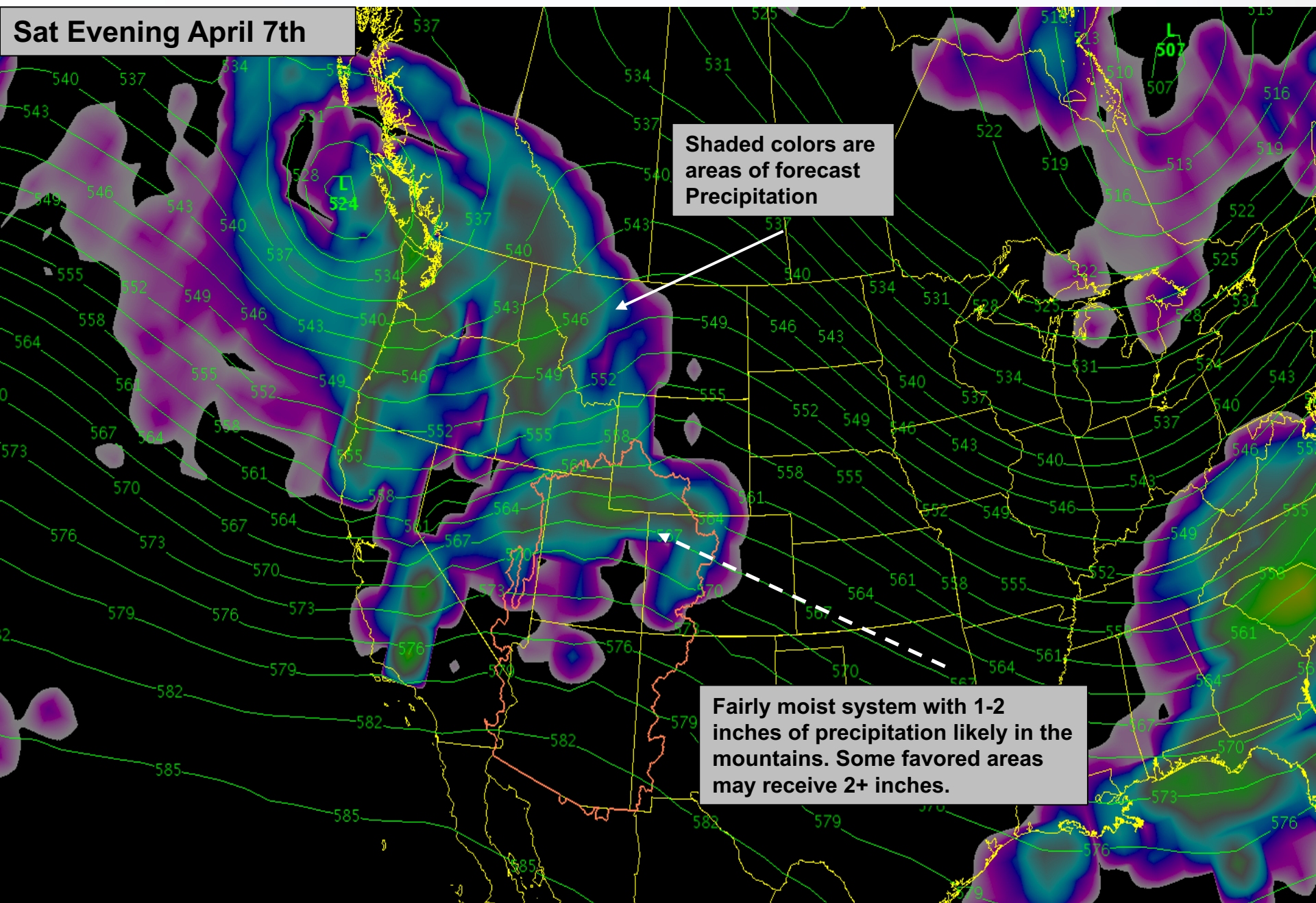
This morning- Apr 6th 2018



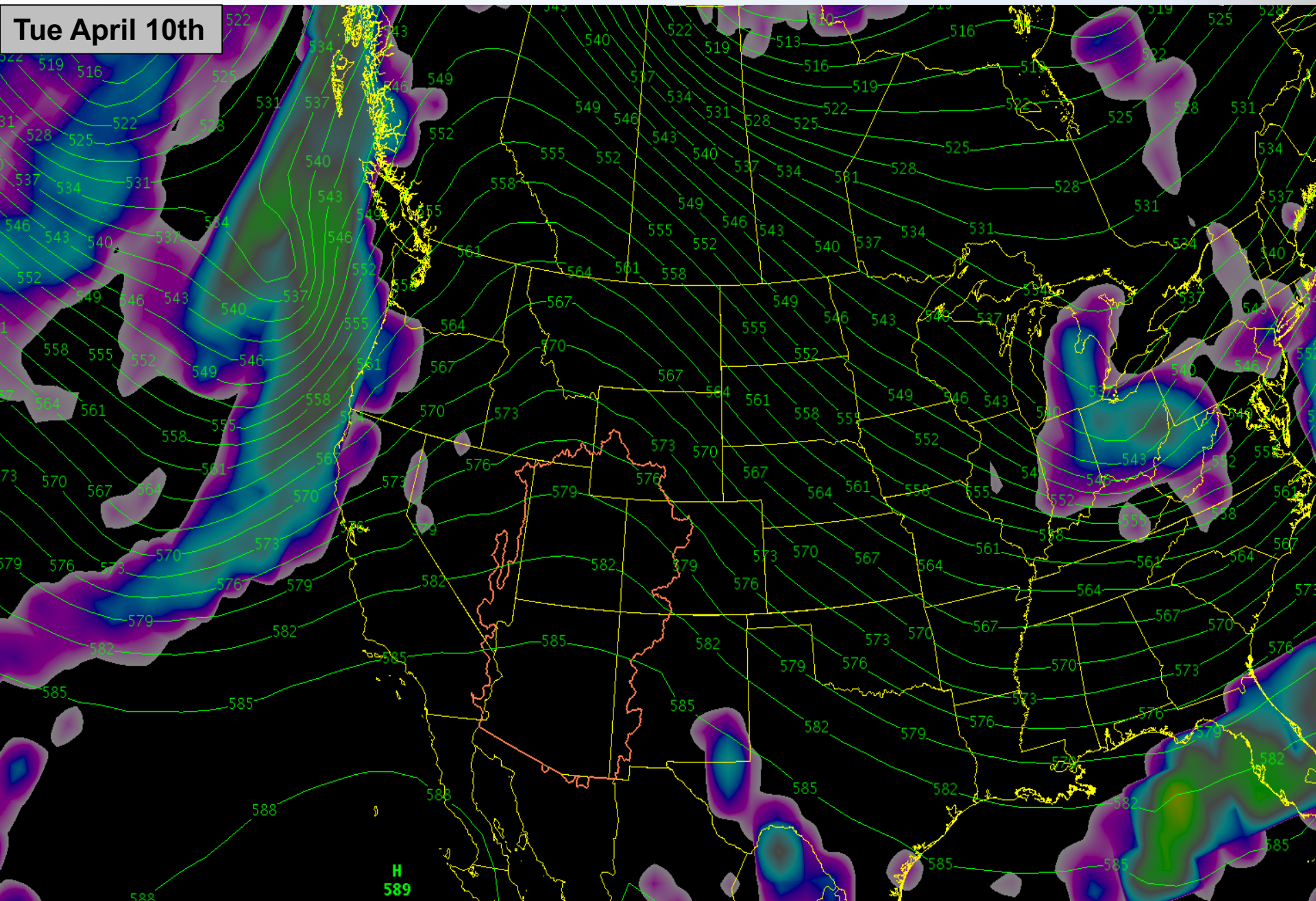
Significant moisture moving into the West Coast. Some of that moisture (lesser amounts) will translate into the Great and Colorado River Basins.

Upcoming Weather: Heaviest precipitation overnight Saturday. Northern basins will be impacted the greatest.

Sat Evening April 7th

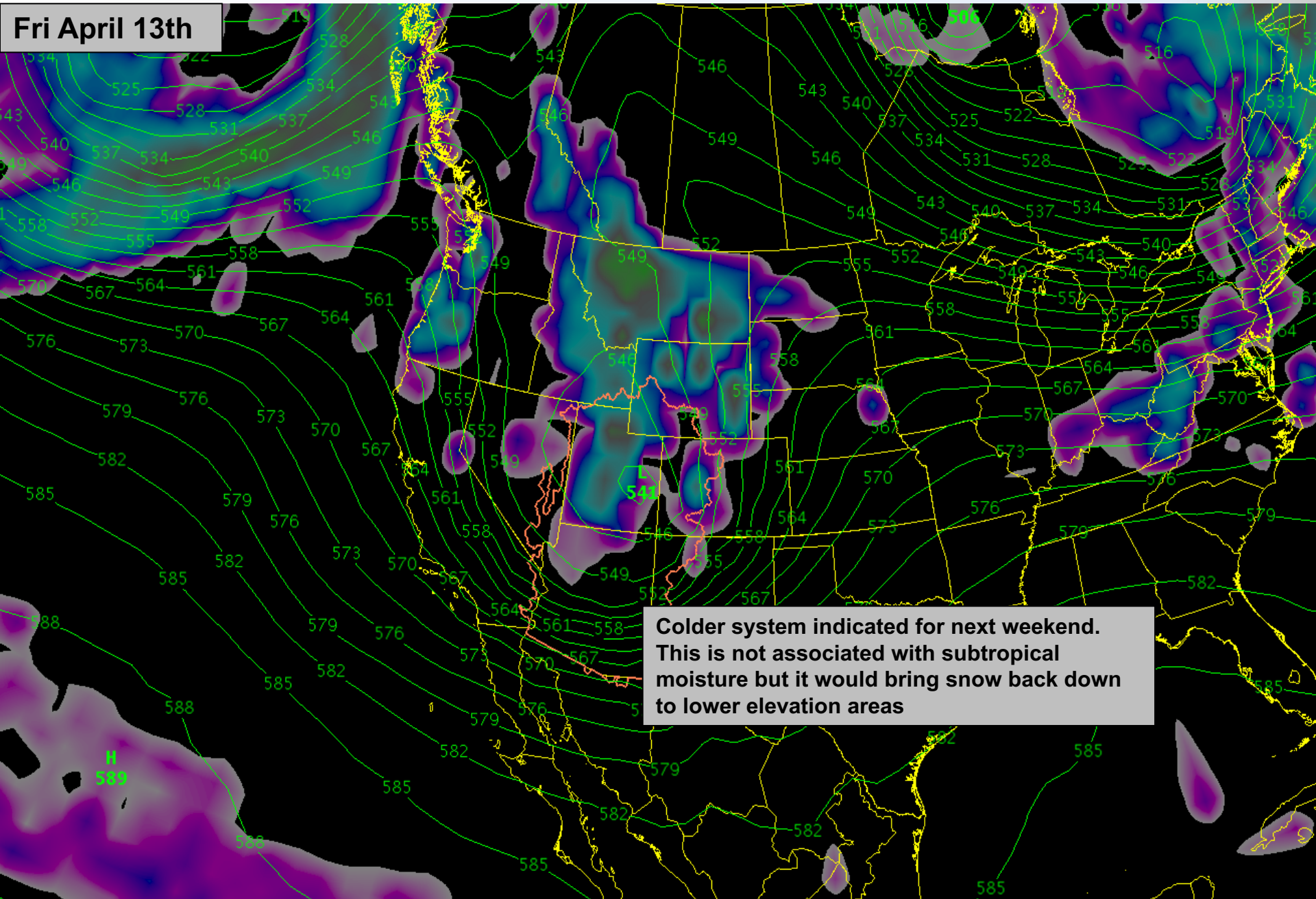


Upcoming Weather: Drying with a ridge of high pressure. Temperatures above normal midweek (5-10 degrees above normal). Pattern remains progressive.



Upcoming Weather: Models suggest a large trough over the forecast area. This would be a beneficial system impacting much of the area if it verifies. Confidence is low.

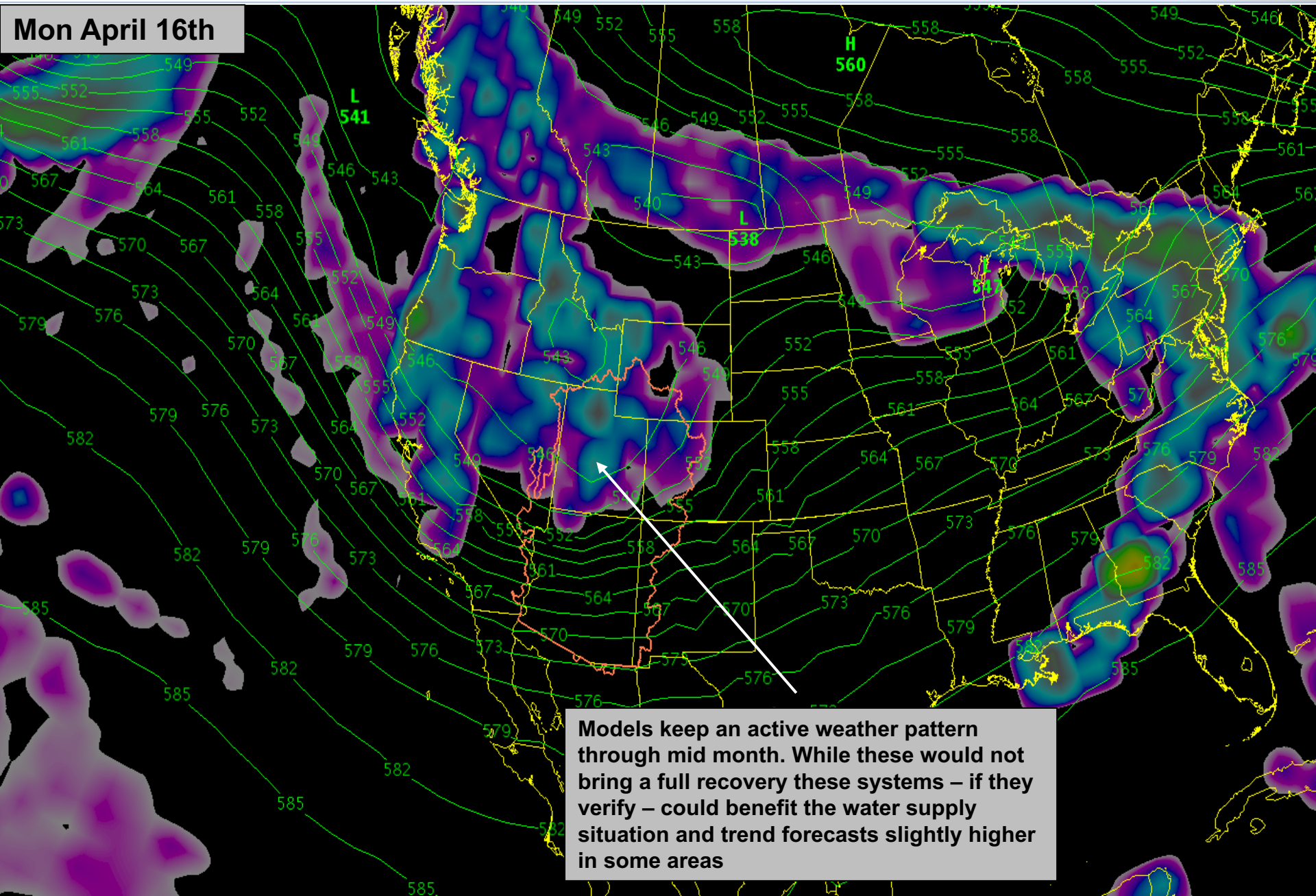
Fri April 13th



**Colder system indicated for next weekend.
This is not associated with subtropical
moisture but it would bring snow back down
to lower elevation areas**

Upcoming Weather: Model suggests another cold trough to start the week of the 16th. While confidence is low these could boost mid month precipitation to above average.

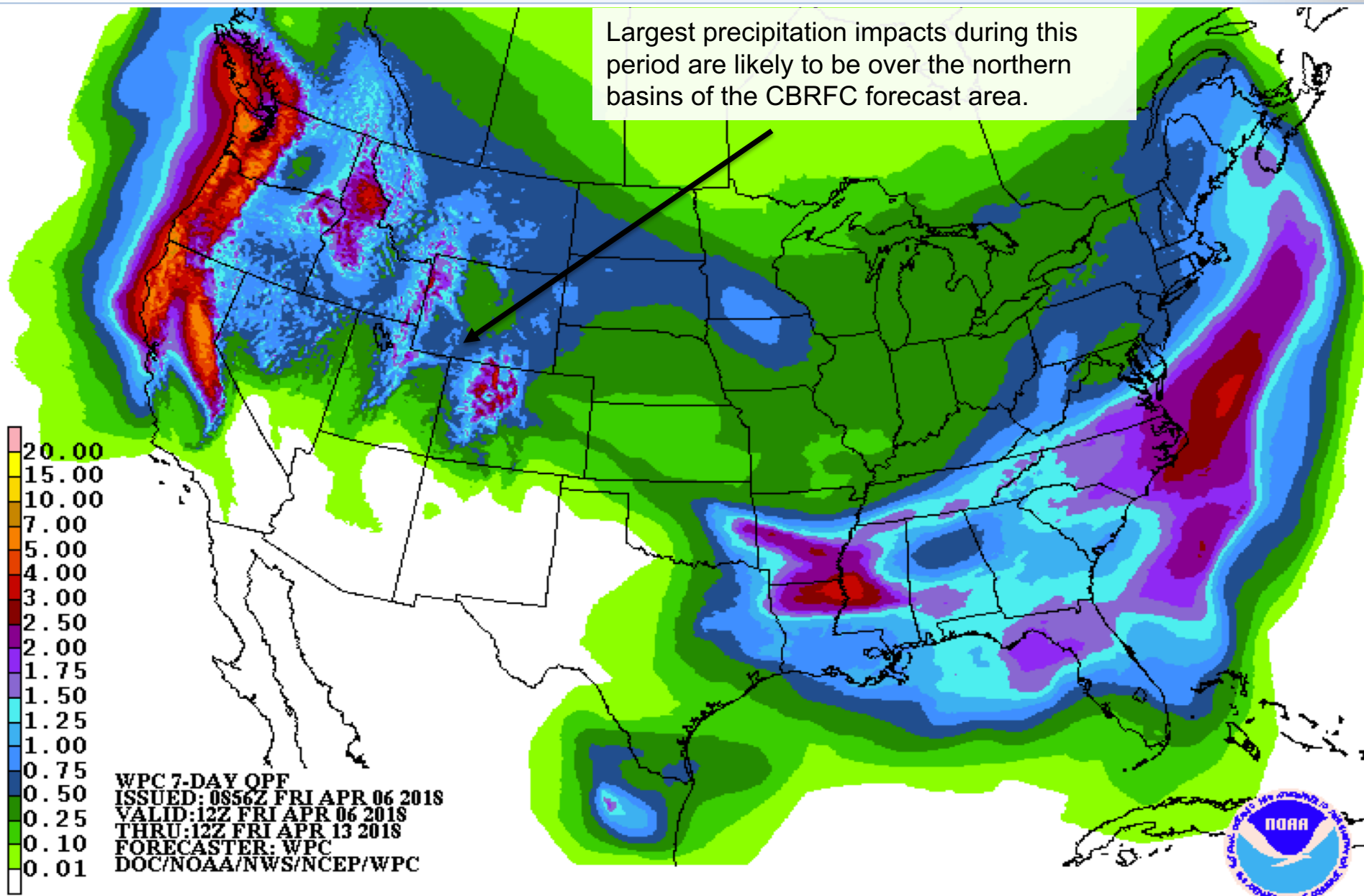
Mon April 16th



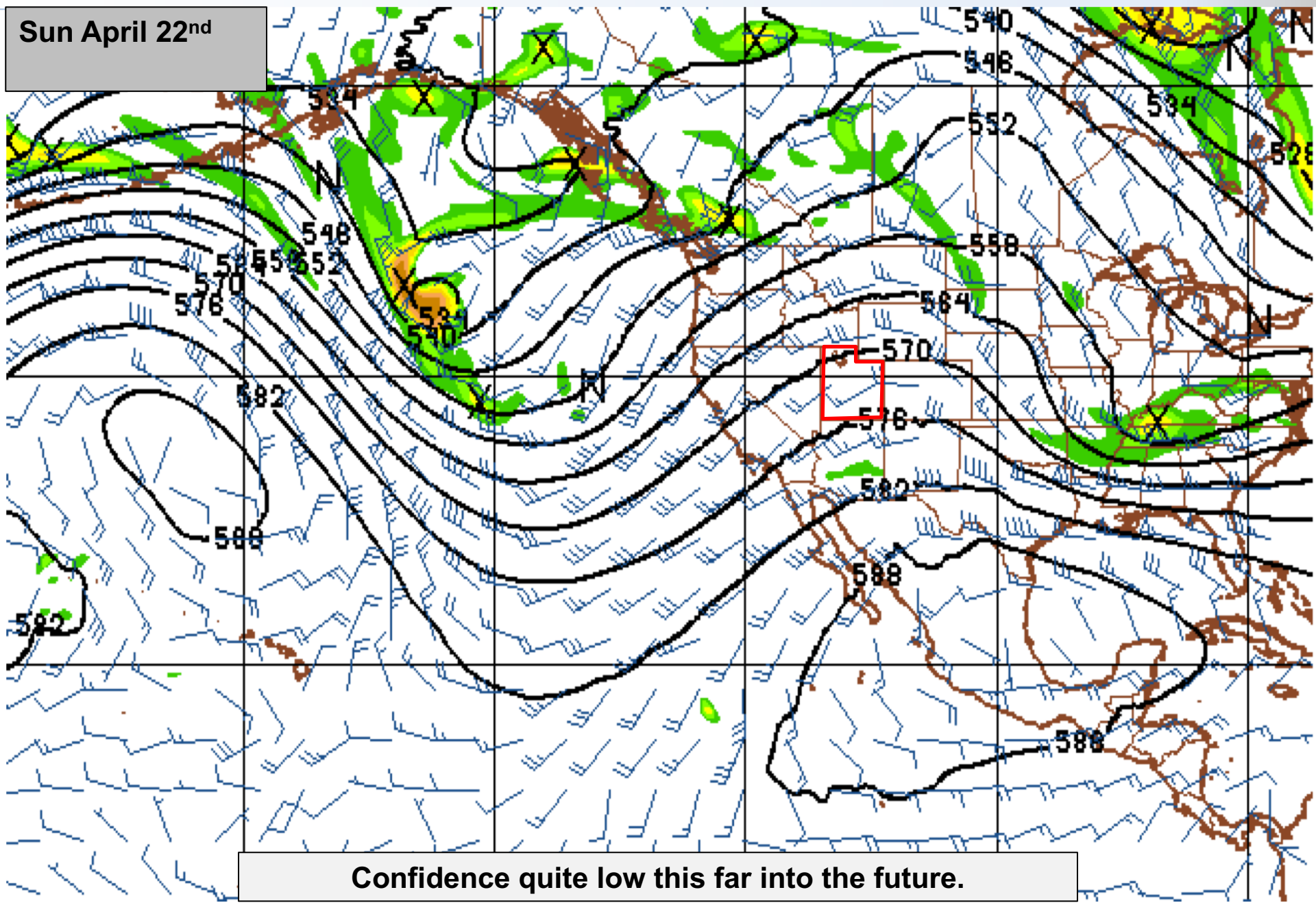
Models keep an active weather pattern through mid month. While these would not bring a full recovery these systems – if they verify – could benefit the water supply situation and trend forecasts slightly higher in some areas

Upcoming Weather

NWS Weather Prediction Center: Precipitation Forecast Apr 6 – Apr 13



Long Range Weather Outlook: This model suggests a period of dry and warmer weather to start the 4th week of April. Pattern may still remain progressive.



Key Points

Snowpack remains well below normal over Utah / Great Basin as of early April, although there was some minor improvement in the Duchesne River Basin in March.

Seasonal to below average temperatures in March helped retain higher elevation snowpack. (Several recent previous years experienced snow loss)

Highest runoff forecasts with respect to average are in the northern Bear River Basin (70-85 % of average) but drop off significantly farther south (Weber 35-55%, Six-Creeks 25-65%, Provo / Utah Lake 20-60%, Sevier 10-40%). Colorado River Basin (Duchesne 30-70%, Virgin 35-45%).

On average the snow accumulation season runs into early to mid April in the runoff producing areas. As we get further into spring significant snow accumulation is less likely. Recovering to average runoff conditions, while possible, is unlikely. The best chances are in the Bear River Basin.

April started dry but the weather pattern is becoming more active. The meteorological model outlook through mid April as of today is favorable for additional precipitation and possible snow. If they verify this could be beneficial and trend forecasts a little higher particularly in the northern basins.

2018 water supply briefing schedule

2018 monthly water supply briefings for the Great Basin:

Monday May 7th @ 1:30 pm MDT

Colorado River Basin webinars are same dates at 11 am MT

A peak flow briefing will be added if conditions warrant.

Date/Times are subject to change. All registration information has been posted to the CBRFC web page.

CBRFC Water Supply Contacts

Please contact us with any questions

Michelle Stokes – Hydrologist In Charge

michelle.stokes@noaa.gov

Paul Miller– Service Coordination Hydrologist

paul.miller@noaa.gov

Basin Focal Points (Forecasters)

Greg Smith – San Juan, Gunnison, Dolores Focal Point

greg.smith@noaa.gov

Ashley Nielson – Green River Basin, Lake Powell Focal Point

ashley.nielson@noaa.gov

Cody Moser – Upper Colorado Mainstem Focal Point

cody.moser@noaa.gov

Tracy Cox and Zach Finch – Lower Colorado Basin, Virgin Focal Point

tracy.cox@noaa.gov

zach.finch@noaa.gov

Brent Bernard – Six Creeks, Provo , Sevier Focal Point

brent.bernard@noaa.gov

Patrick Kormos – Bear, Weber Focal Point

patrick.kormos@noaa.gov