

Colorado River Basin Forecast Areas

March 2016 Colorado River Basin Water Supply Briefing

March 4, 2016

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Colorado Basin River Forecast Center
National Weather Service
NOAA

Please mute your phone
until ready to ask questions



Today's Presentation

Upper Colorado Situational Awareness – Decision Support Tool

February weather conditions and impacts

Current hydroclimatic conditions impacting forecasts
Snowpack, Soil Moisture, El Niño event

Overview of March water supply forecasts

Upcoming weather and climate outlook

Upcoming water supply briefing schedule

Contacts & Questions

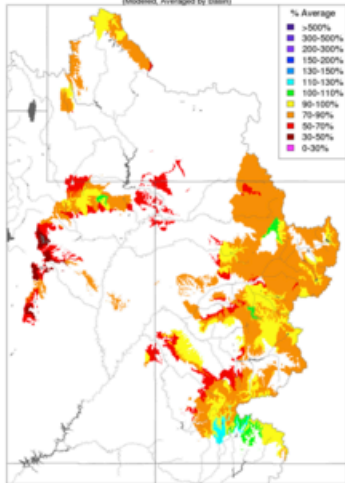
*** Please mute your phone until ready to ask questions ***

Upper Colorado Situational Awareness

Soil Moisture

Soil Moisture - Fall - 2015 (November 01)

(Modeled, Averaged by Basin)

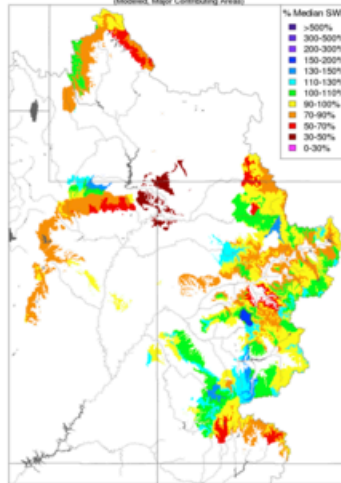


Prepared by NOAA, Colorado Basin River Forecast Center
934 Lake City, Utah, www.cbrfc.noaa.gov

Snow Conditions

Snow Conditions - March 03 2016

(Modeled, Major Contributing Areas)



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

Lake Powell Unregulated Inflow (kaf) Water Year 2016 Forecasts as of 2016-03-01

Period	Obs to Date	Full Fcst	%Avg
Apr-Jul	0	5700	80%
Water Year	1919	9019	83%

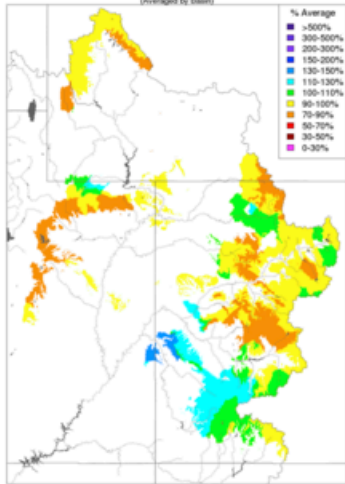
Lake Powell %Average Precipitation Water Year 2016

Area	Oct	Nov	Dec	Jan	Feb	Water Year
UC-Powell	89	100	127	108	51	95

Water Year Precipitation

Water Year Precipitation, October 2015 - February 2016

(Averaged by Basin)

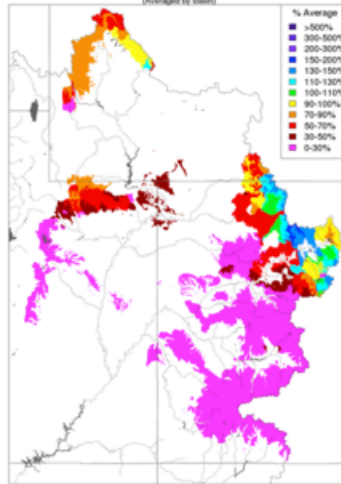


Prepared by NOAA, Colorado Basin River Forecast Center
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Month to Date Precipitation

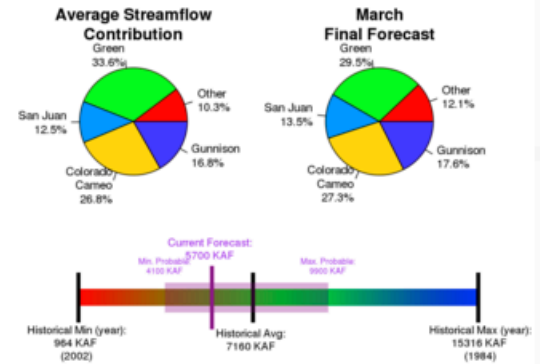
Month to Date Precipitation - March 03 2016

(Averaged by Basin)



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

April - July Unregulated Inflow into Lake Powell As of 2016-03-01



More Information

- Apr-July Text Forecast Product
- Water Year Text Forecast Product
- Snotel Group Plot
- Snotel Group Data
- USBR 24 Month Study

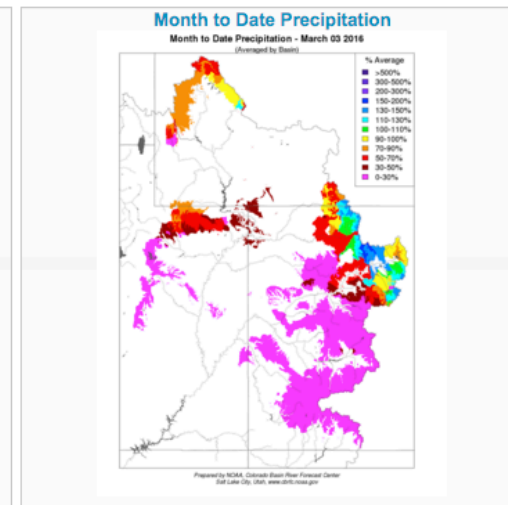
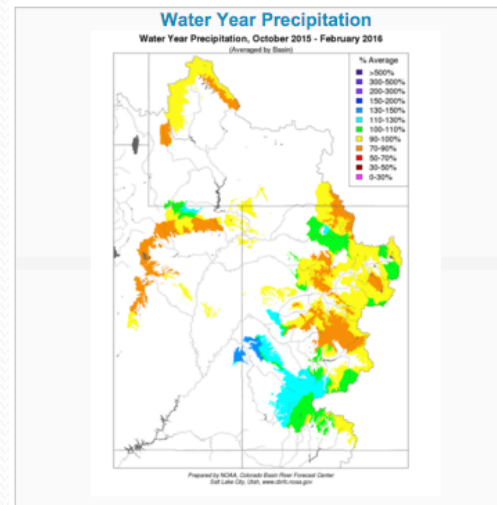
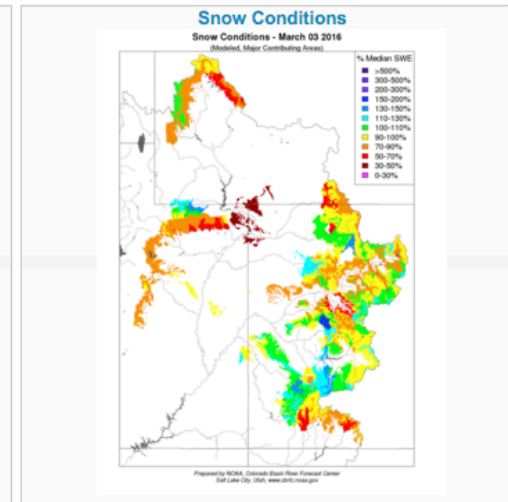
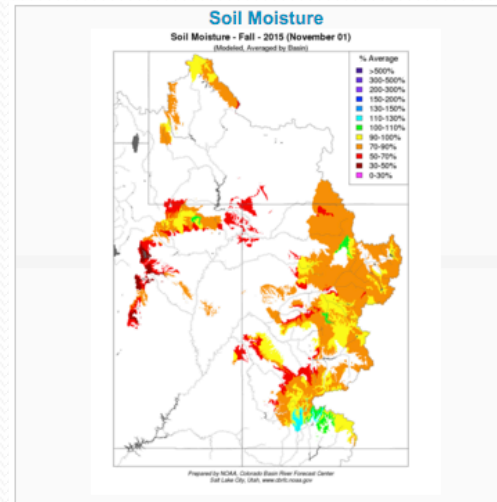
USBR 24 Month Study

Quick look at conditions that affect the water supply forecasts for Lake Powell unregulated inflow
<http://www.cbrfc.noaa.gov/dash/lp.php>
 Under 'Water Supply' Menu

Upper Colorado Situational Awareness

MAPS:

- Values are averaged over CBRFC-defined basin elevation zones used in the hydrologic model and displayed as a percent of average or median.
- Trimmed to those areas (higher elevations) that contribute the most to runoff.
 - Snow maps are also trimmed by the amount of current snow water equivalent (< 2" not included).
- Data types:
 - Fall Modeled Soil Moisture (% Average)
 - Current Modeled Snow Water Equivalent (% Median)
 - Water Year Precipitation (October to end of last complete month)
 - Month to Date Precipitation



Upper Colorado Situational Awareness

TABLES:

- Lake Powell Unregulated Inflow
 - Latest available observations and forecasts for the April-July and Water Year (October-September) periods.
- Lake Powell Basin Precipitation
 - Monthly (and water year to date total) percent average precipitation for the area above Lake Powell.
 - Based on the 'trimmed' areas displayed on the precipitation map on the page.

Lake Powell Unregulated Inflow (kaf)
Water Year 2016 Forecasts as of 2016-03-01

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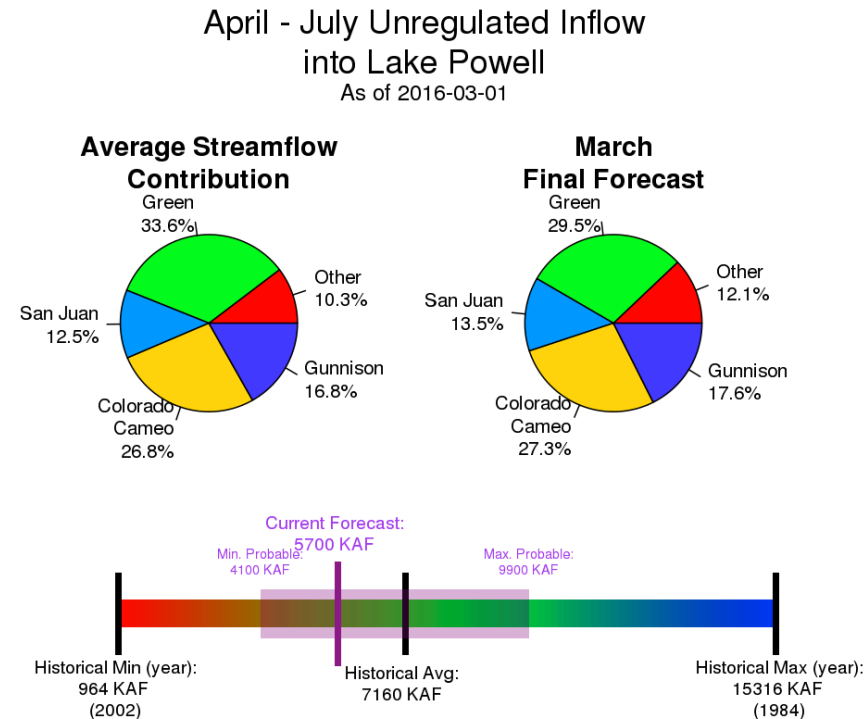
Lake Powell %Average Precipitation
Water Year 2016

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Upper Colorado Situational Awareness

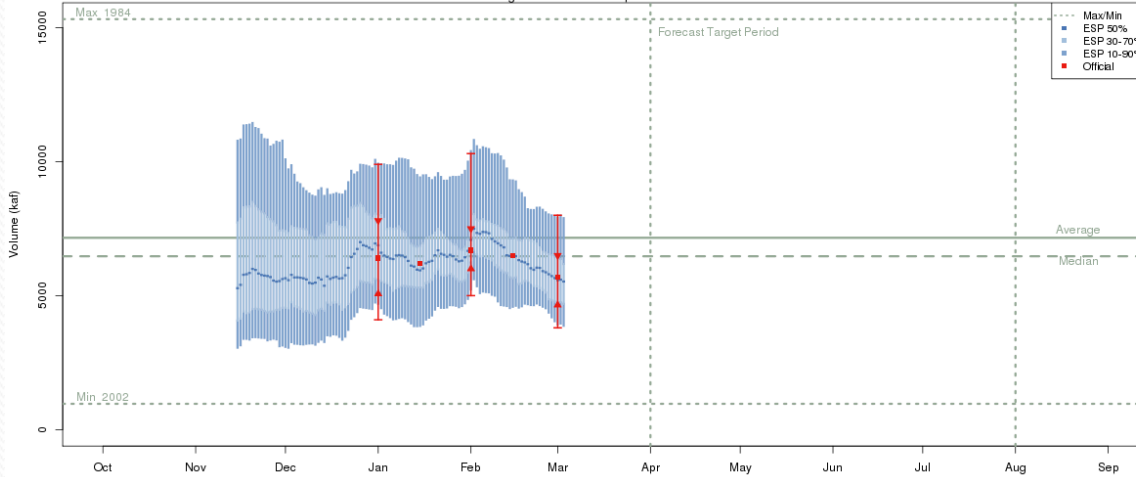
PIE CHARTS:

- Illustrate the relative contribution to the April-July runoff from major sub-basins.
 - Average contribution.
 - Contribution based on latest forecasts.
- Bar chart:
 - Latest 90%, 50%, and 10% exceedance forecasts (purple).
 - Historical Min, Max and 1981-2010 average values (black).



Upper Colorado Situational Awareness

Colorado - Lake Powell- Glen Cyn Dam- At (GLDA3)
 2016-03-01 Apr-Jul Official 50% Forecast: 5700 kaf (80% of average)
 ESP is Unregulated and No Precipitation Forecast Included



The latest (2016-03-03) 50% ESP forecast is 5527 kaf.
 Plot Created 2016-03-03 14:33:41, NOAA / NWS / CBRFC
 Forecasts in the forecast target period include observed values.

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:END
:
:Other Reservoir Unregulated i
:
: B SLC 160331 M DH24/DC1603021
: .B1 DY160801/DVM04/QCVFEZ5
:
:
: nov dec
: GLDA3:Lake Powell 421 266
: GBRW4:Fontenelle 40 36
: GRN01:Flaming Gorge 38 38
: BMDC2:Blue Mesa 30 27
: MPSC2:Morrow Point 31 28
: CLSC2:Crystal 34 32
: TPIC2:Taylor Park 5.2 5.1
: VCRC2:Vallecito 10.7 6.9
: NVRN5:Navajo 35 22
: LEMC2:Lemon 1.78 1.15
: MPH2:McPhee 4.5 3.9
: RBSC2:Ridgway 5.7 4.6
:
: .END
    
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COLORADO BASIN RIVER FORECAST CENTER WY2016 MONTHLY OUTLOOKS

1-Mar-16
 UNREGULATED VOLUMES (KAF) BASED ON ESP 50% EXCEEDANCE VALUES

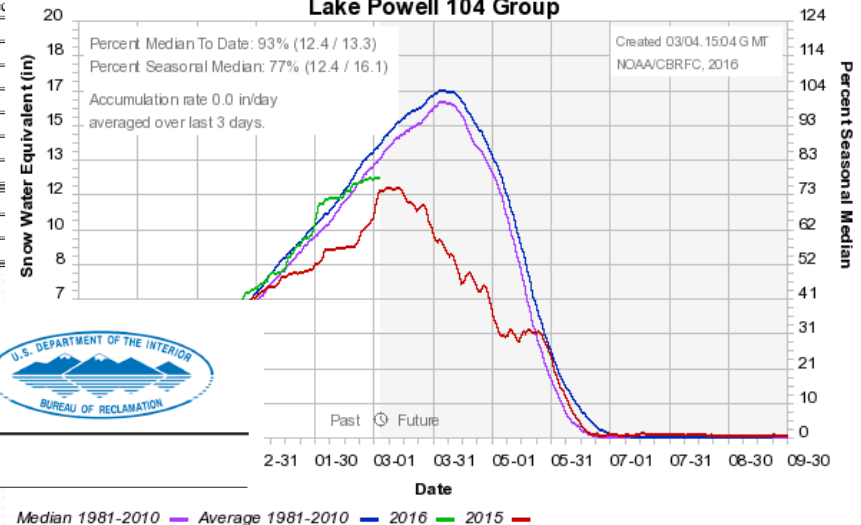
		Powell	Fontenelle	Flaming Gorge	BlueMesa	MorrowPoint	Crystal	TaylorPark	Vallec
2016	March	700	51	102	36	39	45	4	10
2016	April	850	65	105	70	80	90	8	23
2016	May	1900	100	160	180	200	225	23	77
2016	June	2150	230	265	240	255	290	38	66
2016	July	800	120	130	90	95	105	16	24
2016	August	380	52	65	47	51	56	8	17
2016	September	320	36	43	37	40	46	7	14
2016	Apr-Jul 50%	5700	515	660	580	630	710	85	190
2016	Apr-Jul 10%	8000	725	1070	840	890	970	115	245
2016	Apr-Jul 90%	3800	315	395	450	500	580	65	131

SUMMARY for 20160304

swdly - lkpow - sw

DAILY SWE	OBS	AVG	%AVG	MED	%MED
BISON LAKE BLSC2	17.30	21.92	79	19.30	90
BERTHOUD SUMMIT BTSC2	14.20	14.38	99	14.40	99
LAKE IRENE LKIC2	16.40	19.61	84	19.80	83
LYNX PASS LYNC2	9.80	9.26	106	9.05	108
PHANTOM VALLEY PHTC2	7.20	8.42	86	8.45	85
STILLWATER CREEK SCSC2	7.90	7.43	106	7.00	113
WILLOW CREEK PASS WLLC2	10.80	9.98	108	9.90	109
COPPER MOUNTAIN CPMC2	11.80	11.40	104	11.30	104
FREMONT PASS FMTC2	12.10	13.16	92	12.00	101
GRIZZLY PEAK GZPC2	13.60	13.38	102	13.40	101
HOOSIER PASS HOOC2	12.00	11.81	102	11.10	108
SUMMIT RANCH SUMC2	8.90	9.27	96	8.80	101
VAIL MOUNTAIN VLNC2	13.90	16.05	87	14.85	94
INDEPENDENCE PASS IDPC2	12.20	13.34	91	12.90	95
KILN KLNC2	10.50	10.05	105	9.65	109
NORTH LOST TRAIL NLSC2	11.20	15.07	74	13.50	83
NAST LAKE NSSC2	7.30	7.16	102	6.70	109
SCHOFIELD PASS SOS2	21.10	28.05	75	26.00	81
MESA LAKES MES2	13.00	14.13	92	13.05	100
BUTTE BUTC2	10.30	12.57	82	11.20	92
PARK CONE PKC2	7.00	8.90	79	8.40	83
SLUMGULLION SLMC2	12.20	10.89	112	10.50	116
PORPHYRY CREEK PRPC2	13.90	12.90	108	12.35	113
MCCLURE PASS MCP2	13.30	14.83	90	14.10	94
OVERLAND RES OVRC2	8.00	11.48	70	10.30	78

Colorado Basin River Forecast Center Lake Powell 104 Group



OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

February 2016 24-Month Study

Most Probable Inflow*

Hoover Dam - Lake Mead



Glen Release Date	Side Inflow Glen to Hoover (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Total Release (1000 CFS)	SNWP Use (1000 Ac-Ft)	Downstream Requirements (1000 Ac-Ft)	Bank Storage (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	EOM Storage (1000 Ac-Ft)

Median 1981-2010 Average 1981-2010 2016 2015

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Upcoming weather and climate outlook

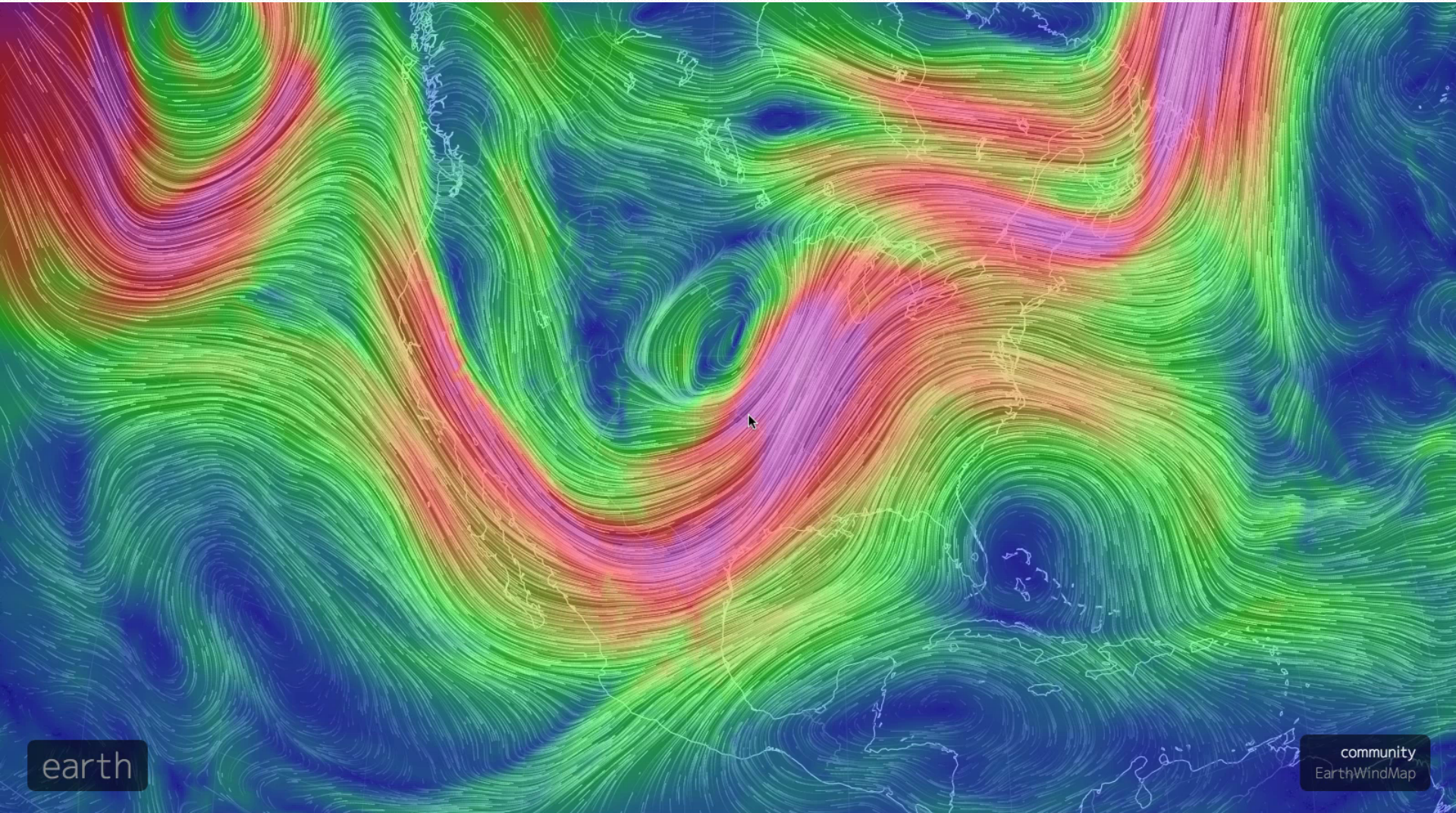
Upcoming water supply briefing schedule

Contacts & Questions

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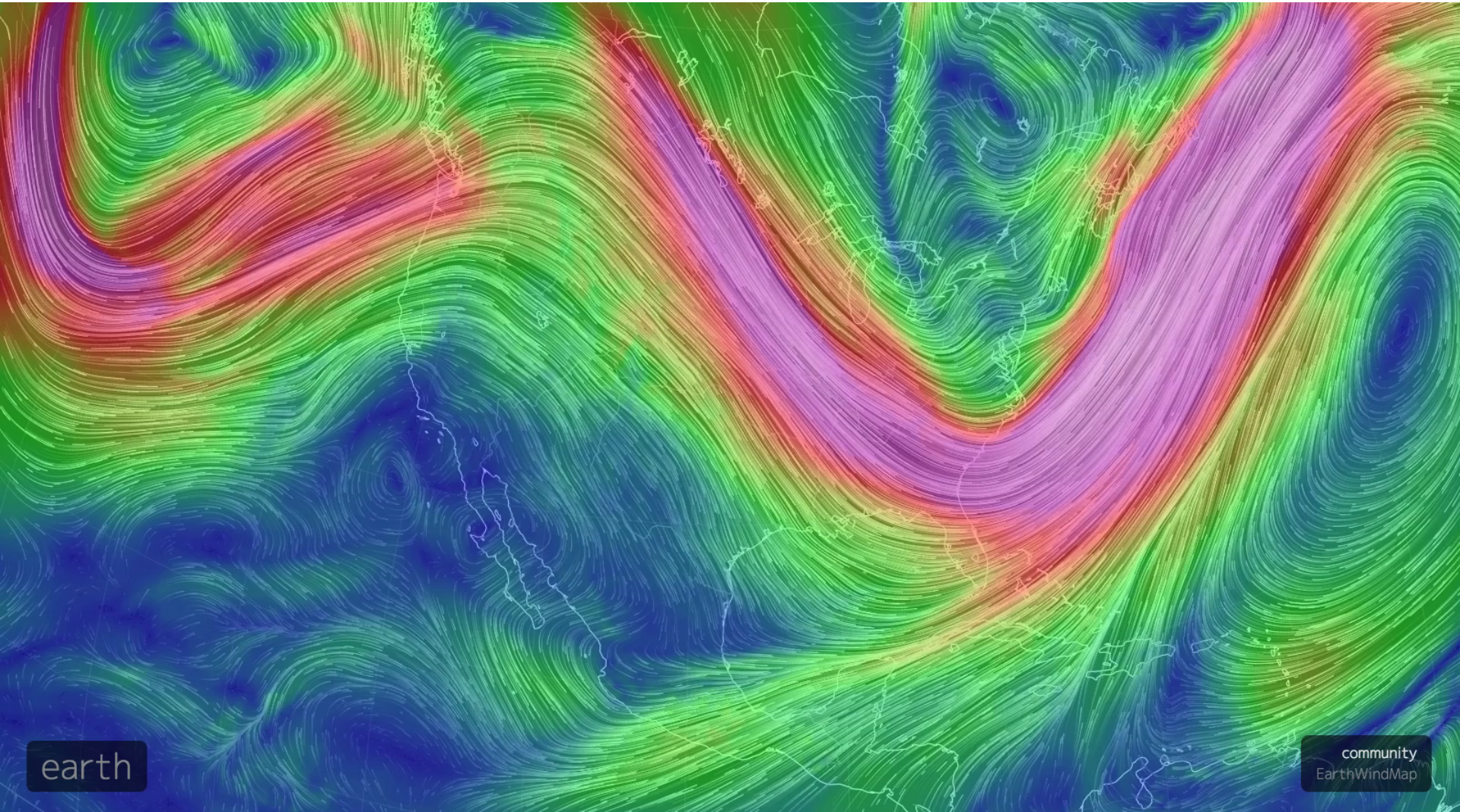
2016 February Weather

February 2nd 500 mb (Jet Stream)
Trough brought moisture and storm activity



2016 February Weather

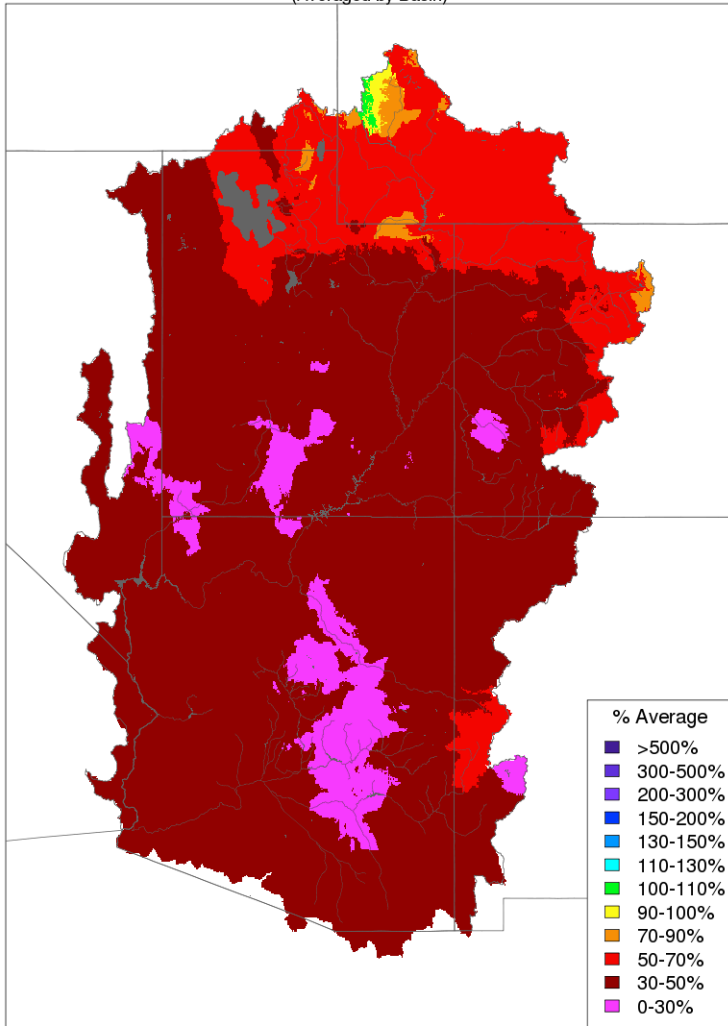
By Mid-February, a high pressure system set up over the CBRFC area, resulting in a very dry, warm, February



February Precipitation and Temperature

Monthly Precipitation - February 2016

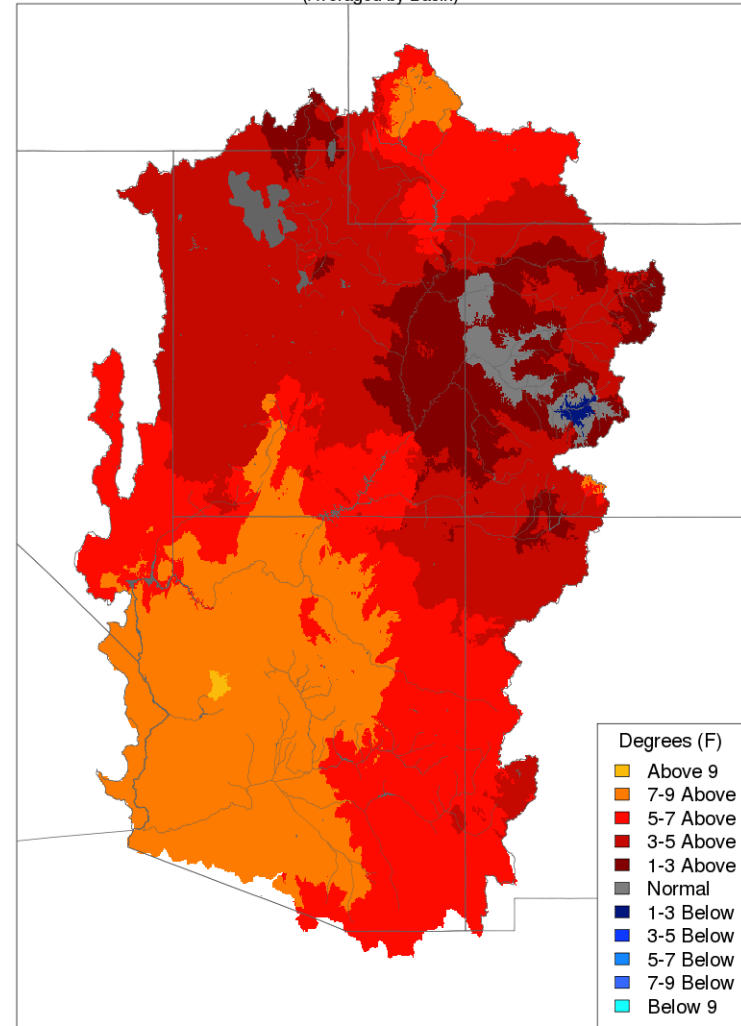
(Averaged by Basin)



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

Max Temp - Monthly Deviation - February 2016

(Averaged by Basin)

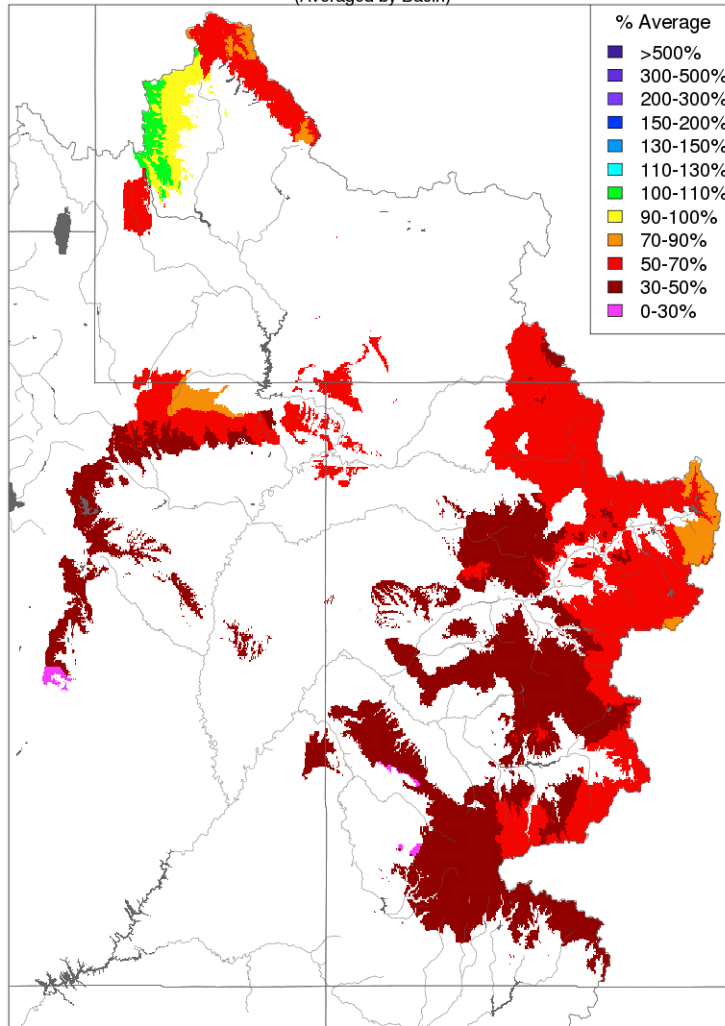


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February Precipitation and Temperature

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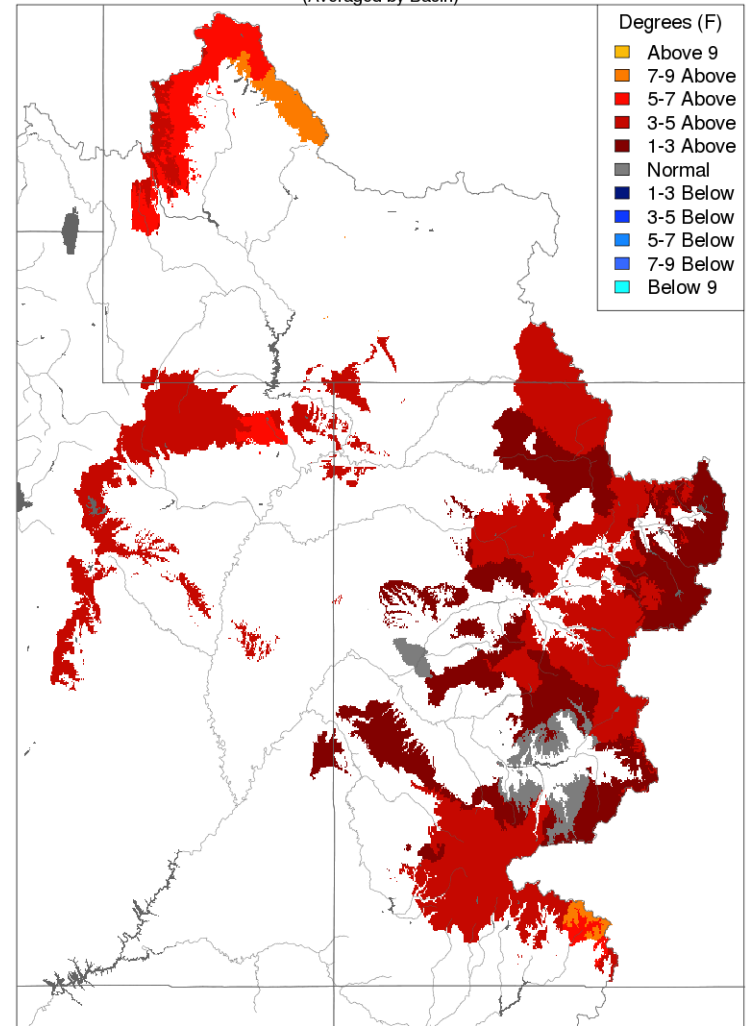
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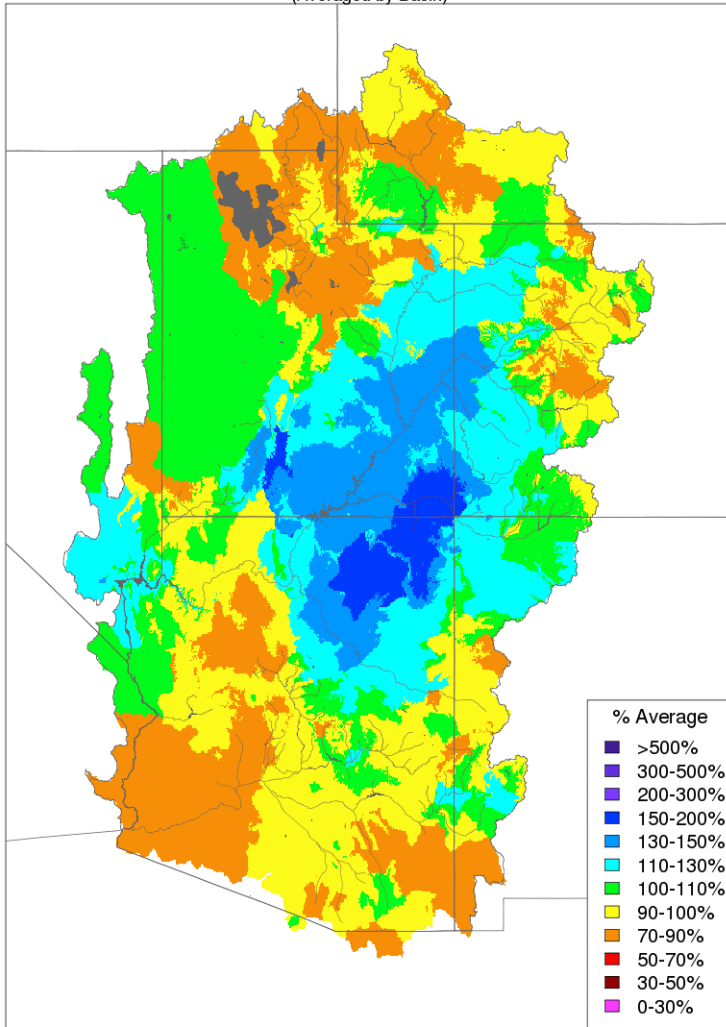


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Water Year Precipitation

Water Year Precipitation, October 2015 - February 2016

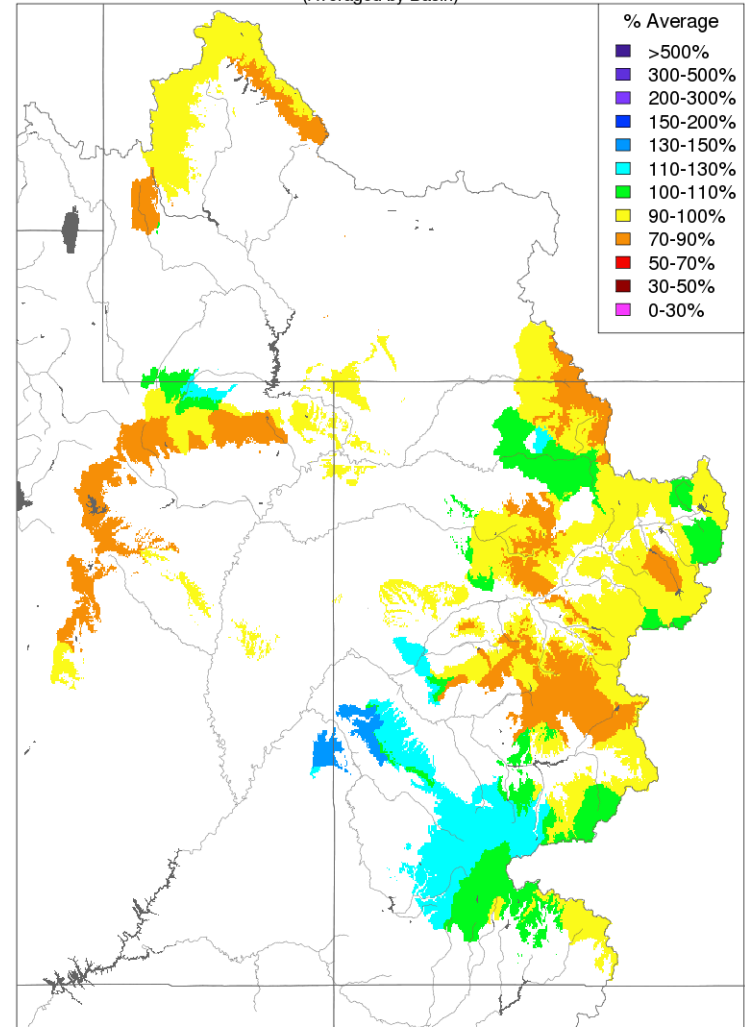
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Water Year Precipitation, October 2015 - February 2016

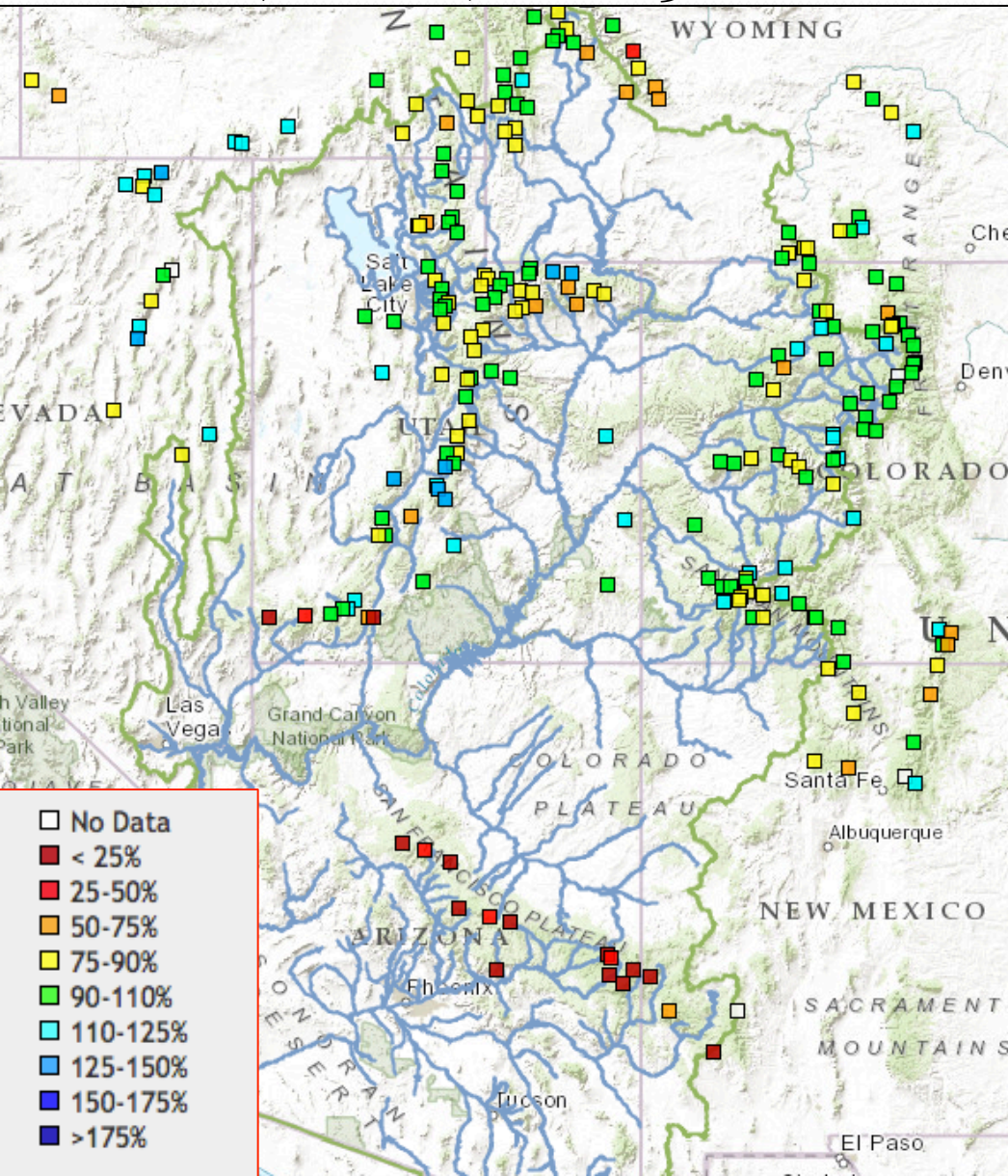
(Averaged by Basin)



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Snow – SNOTEL Network

Snow (% median): March 3, 2016

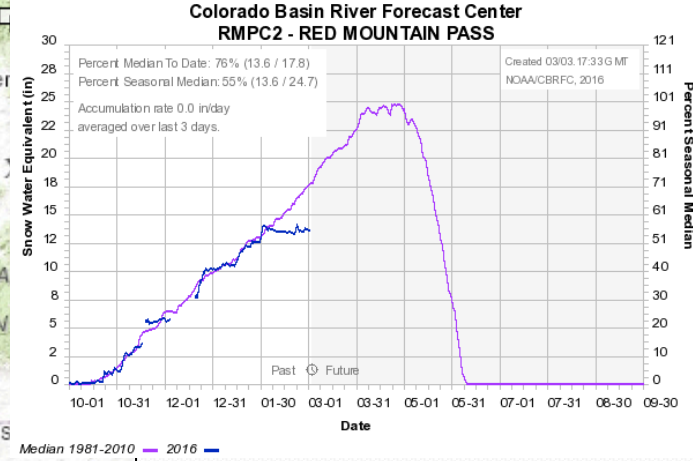
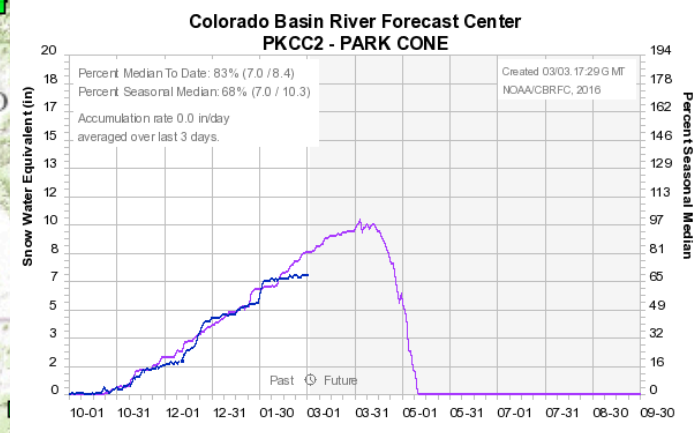
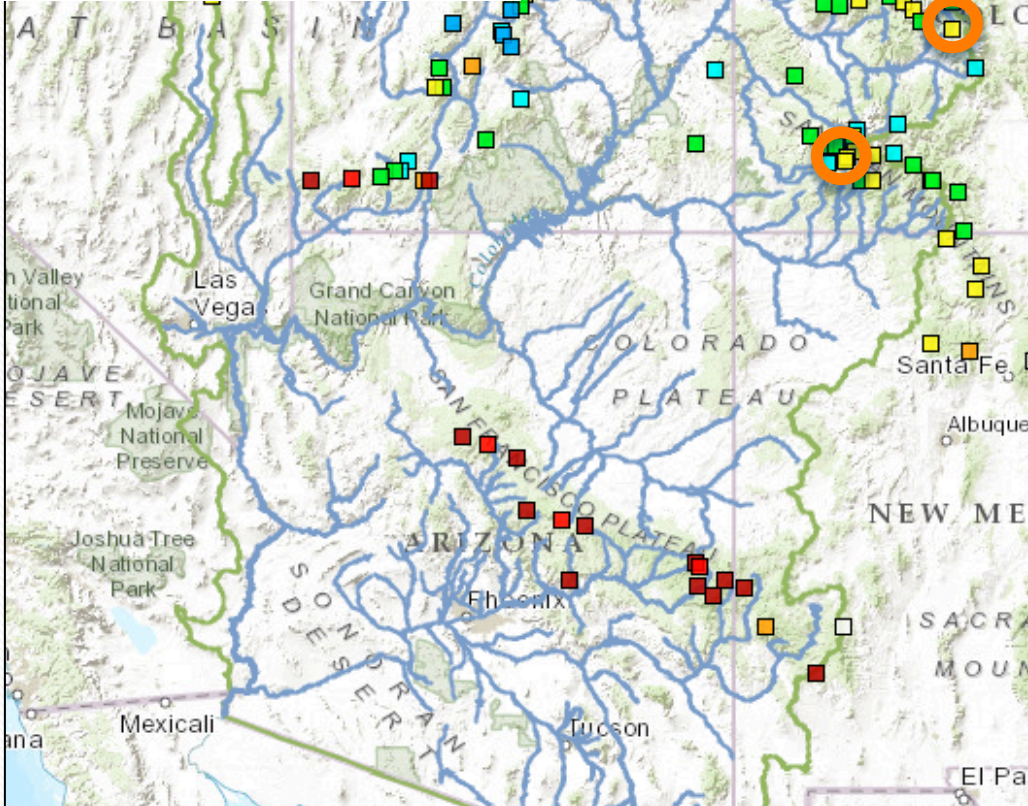
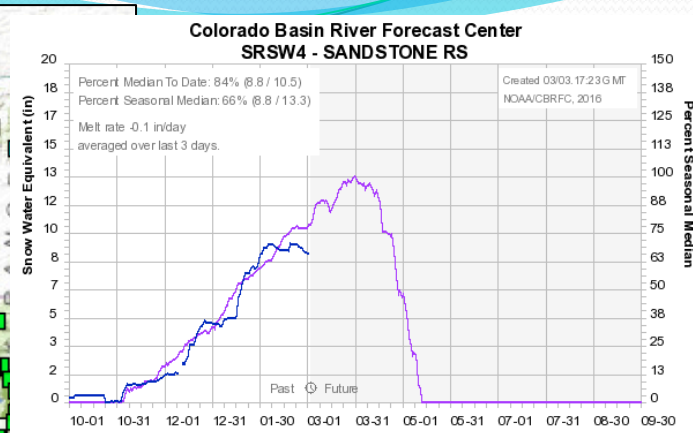
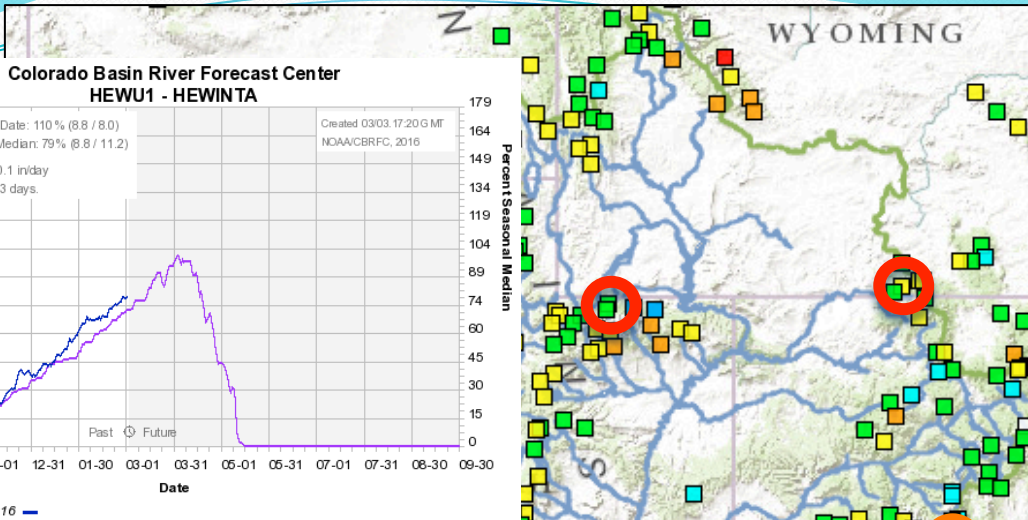


Despite near normal snowpack conditions at many sites in the Upper Colorado River Basin, February was historically dry

Many SNOTEL sites recorded precipitation amounts that were among the driest in their historical record

Area	# of Sites reporting February Precip in Top 5 driest
Green	11 (3 driest)
Yampa	10 (5 driest)
Upper Colorado	10
Gunnison	7
Dolores	3 (1 driest)
San Juan	11 (2 driest)

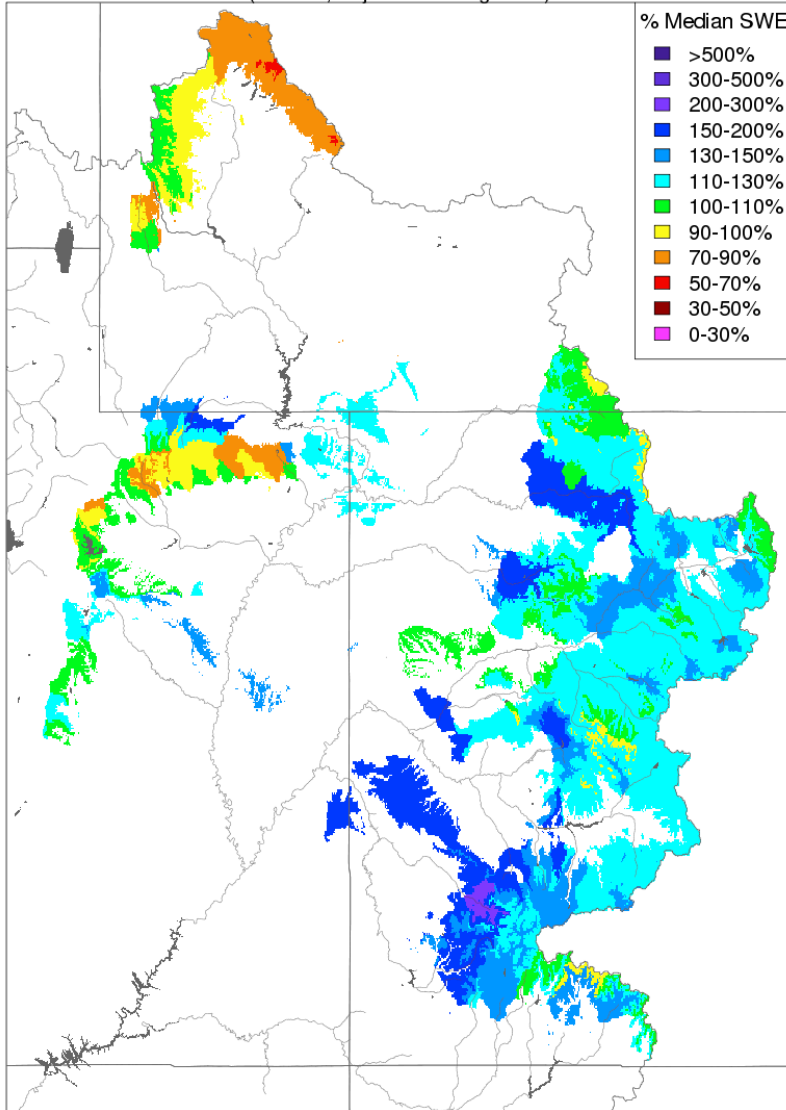
Snow - SNOTEL Network



Snow - CBRFC Hydrologic Model

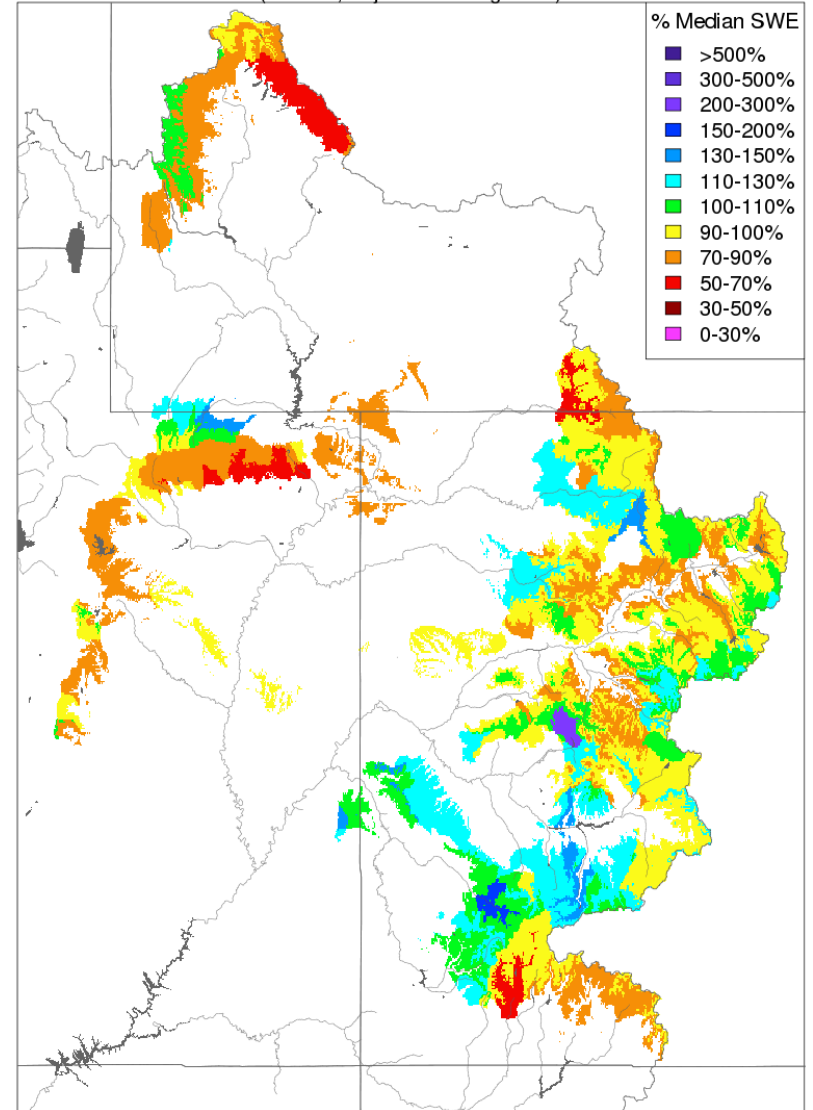
Feb 1st 2016

Snow Conditions - February 01 2016
(Modeled, Major Contributing Areas)



Mar 1st 2016

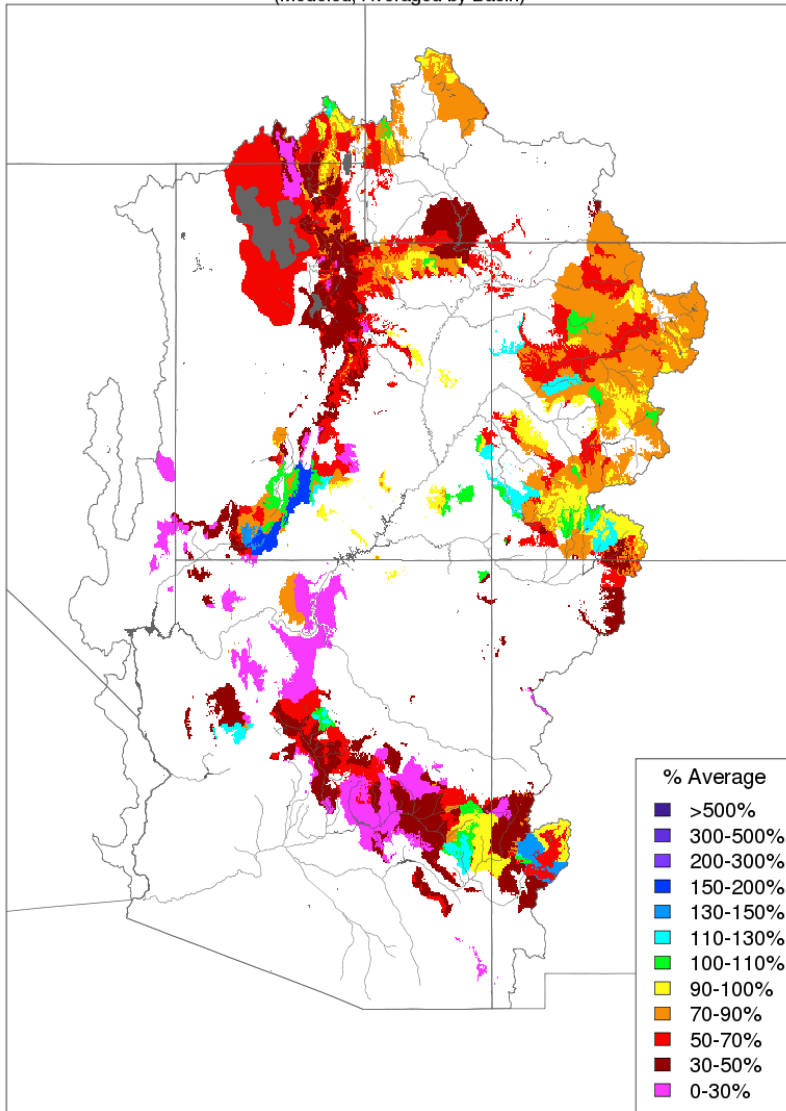
Snow Conditions - March 01 2016
(Modeled, Major Contributing Areas)



Soil Moisture Summary

Soil Moisture - Fall - 2015 (November 15)

(Modeled, Averaged by Basin)



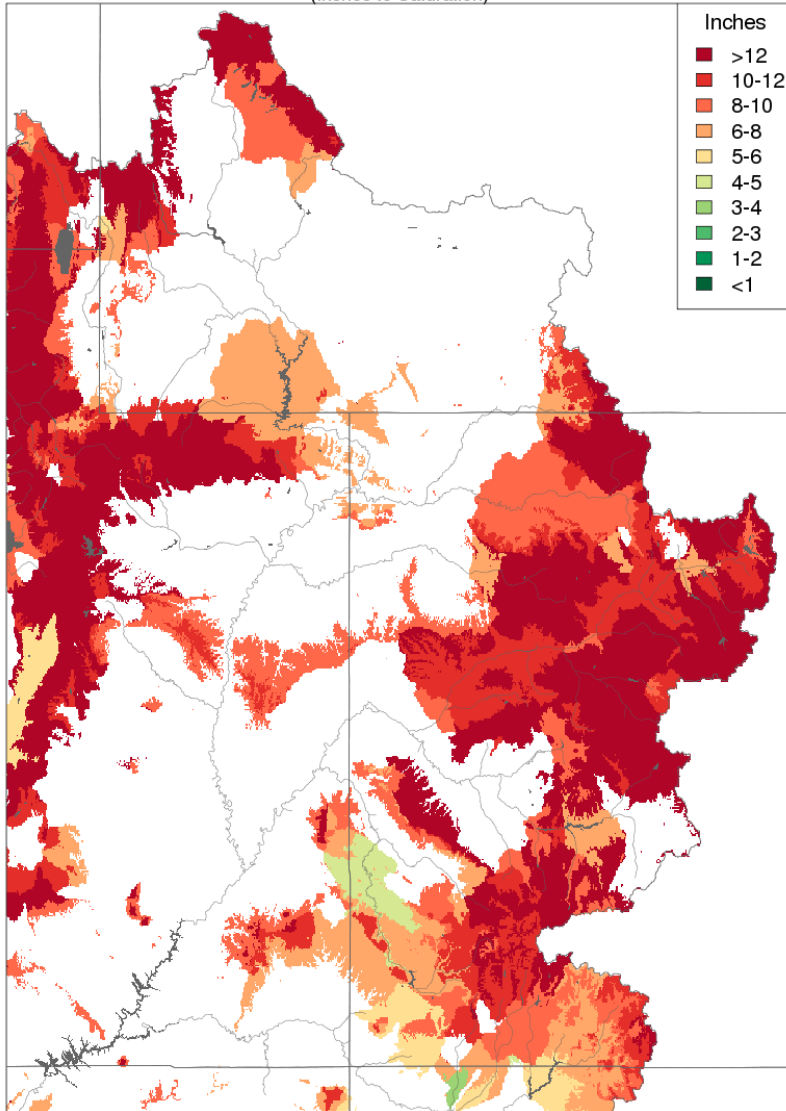
Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Dry Fall soil moisture conditions (as represented by the CBRFC's hydrologic model) over much of the CBRFC region have impacted streamflow forecasts, as runoff is forecasted to be relatively inefficient

Lower basin conditions can be more variable, as Fall and Spring rains and other storm events can impact soil moisture conditions significantly

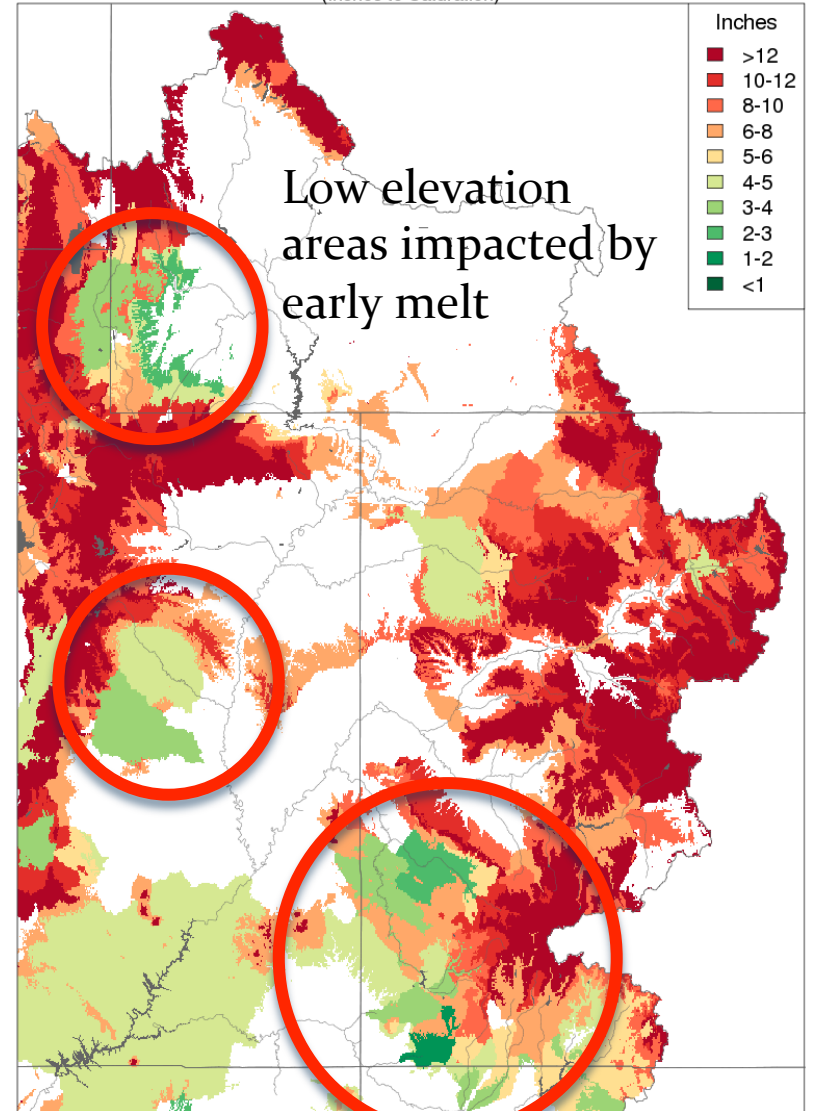
Soil Moisture Summary

Soil Moisture - February 01 2016
(Inches to Saturation)



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

Soil Moisture - March 01 2016
(Inches to Saturation)



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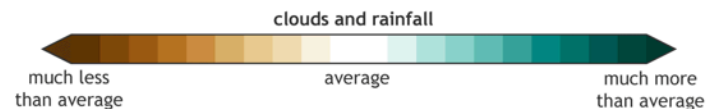
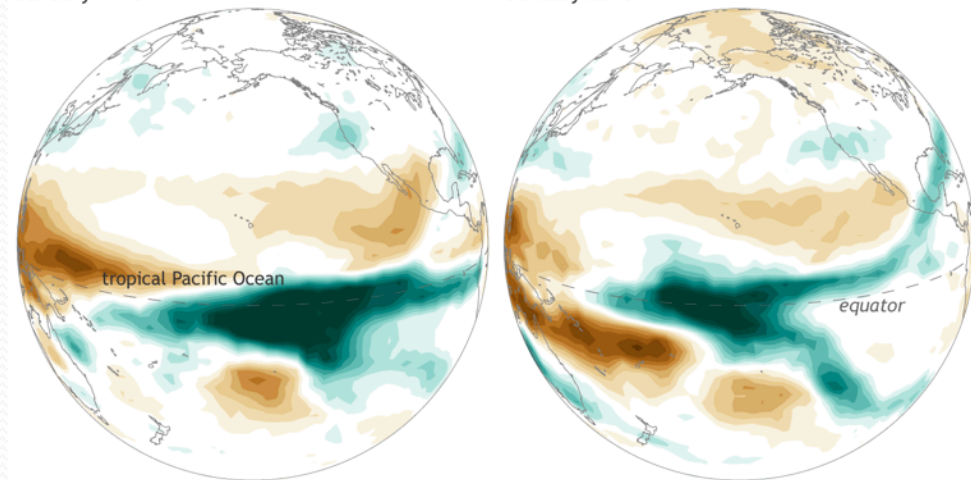
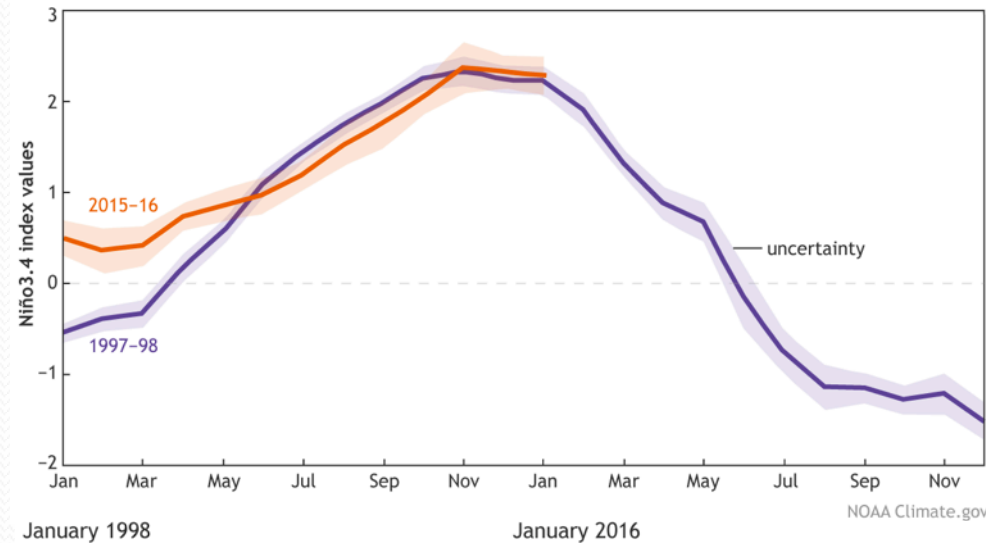
Dónde está El Niño?

Usually, during an ENSO event, we can expect to see increased winter precipitation over the Lower Colorado River Basin; impacts elsewhere are not significant

While this is shaping up to be one of the strongest El Niño events on record, the Colorado River Basin, in general, has not seen much in the context of increased precipitation and/or streamflow

CPC forecasts still indicate a higher likelihood of precipitation over much of the region over the Spring months

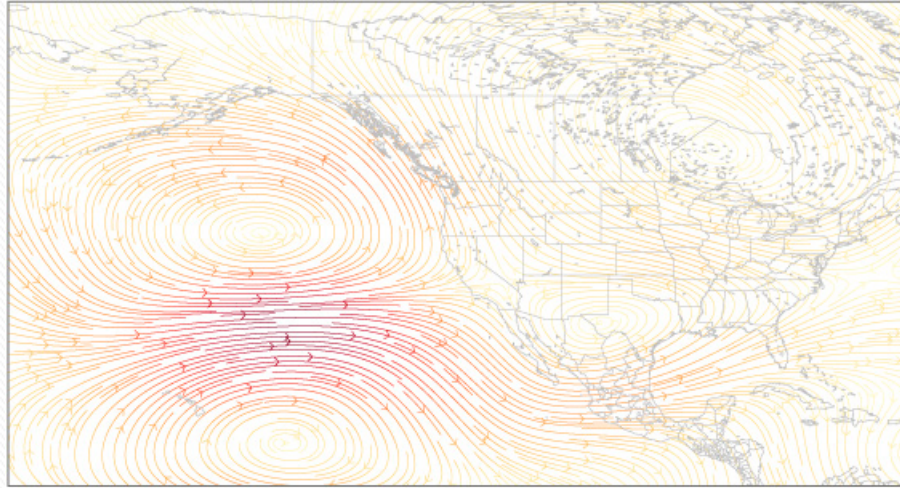
Monthly ERSSTv4 Niño3.4 index values



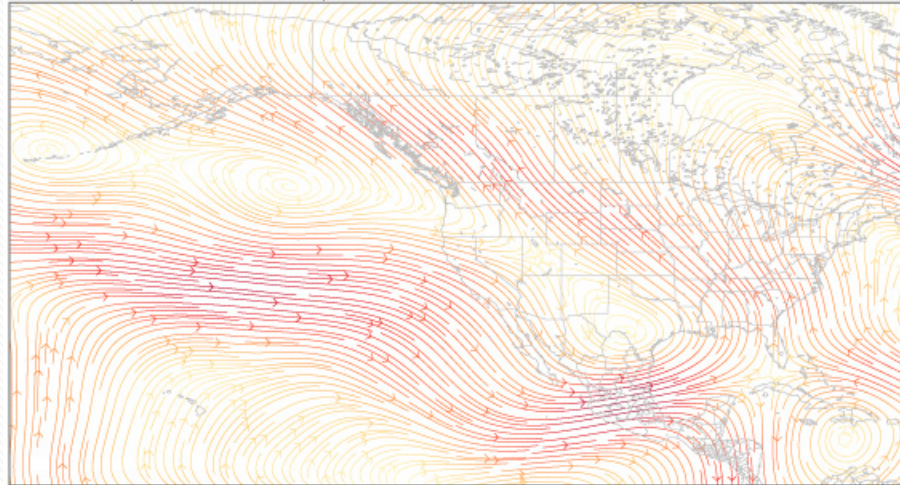
NOAA Climate.gov

El Niño Impacts

average El Niño winter (Dec-Jan)



this winter (Dec 2015-Jan 2016)



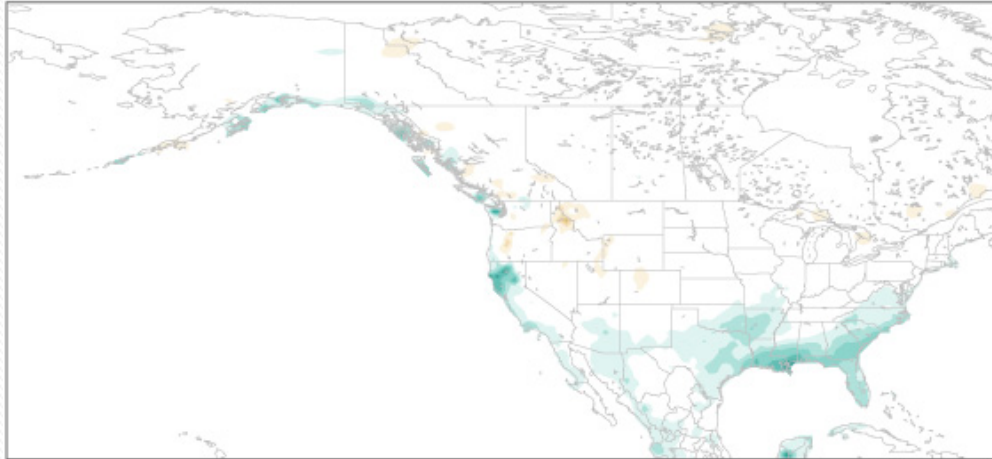
Impacts from this particular El Niño event have not really “looked” like an “average” El Niño event

Jet stream for this particular ENSO event has moved more northward from average, delivering precipitation to the Pacific Northwest area; the Colorado River Basin has generally missed this activity

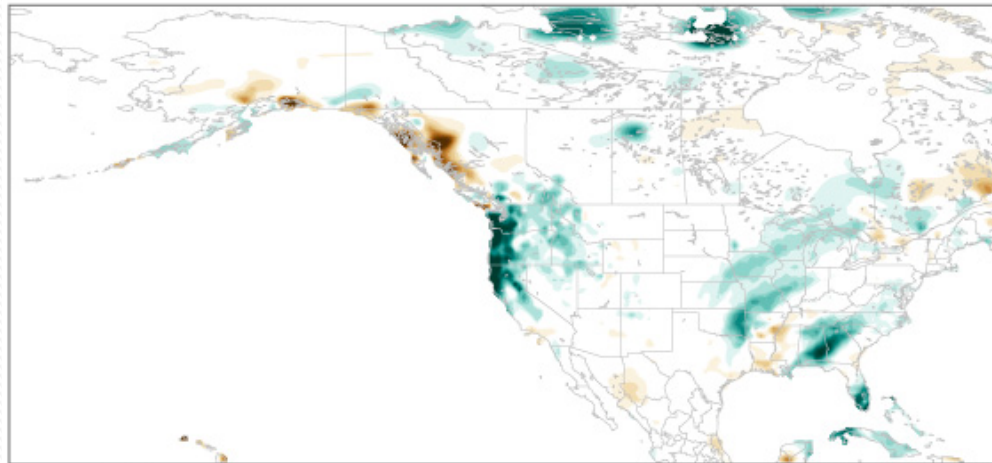
A positive Arctic Oscillation probably contributed to jet stream movement

El Niño Impacts

average El Niño winter (Dec-Jan)



this winter (Dec 2015-Jan 2016)



While we typically see wetter conditions in the southern portion of the Lower Colorado River Basin, the Colorado River Basin experienced near average precipitation this winter

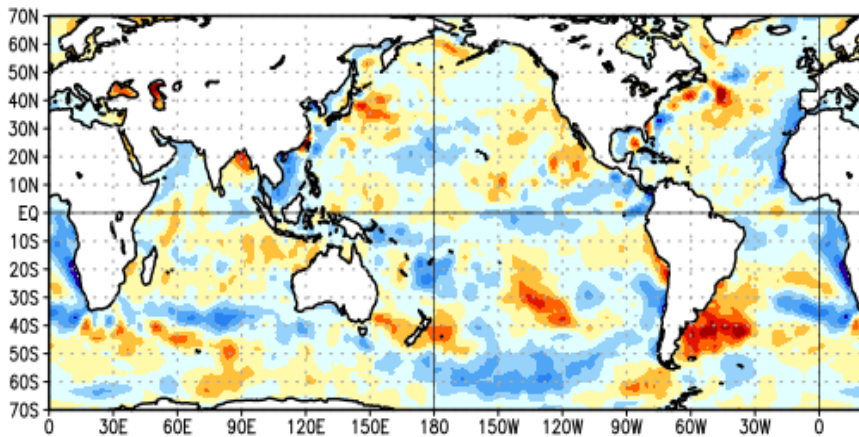
Forecasts in the Lower Colorado River Basin take into account the presence of an El Niño or La Niña event; our forecasts in the Lower Colorado River Basin have tended to be higher than raw model guidance

El Niño Impacts

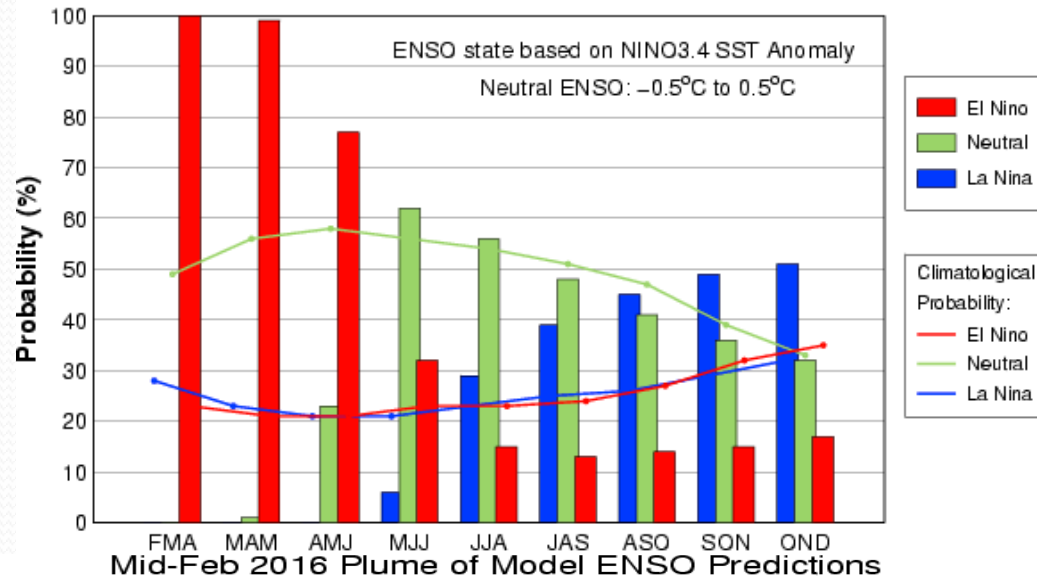
El Niño is currently weakening, and models are suggesting a return to neutral condition by late Spring, and possibly La Niña conditions by late next Fall

Spring predictability barrier increases the uncertainty of ENSO forecast

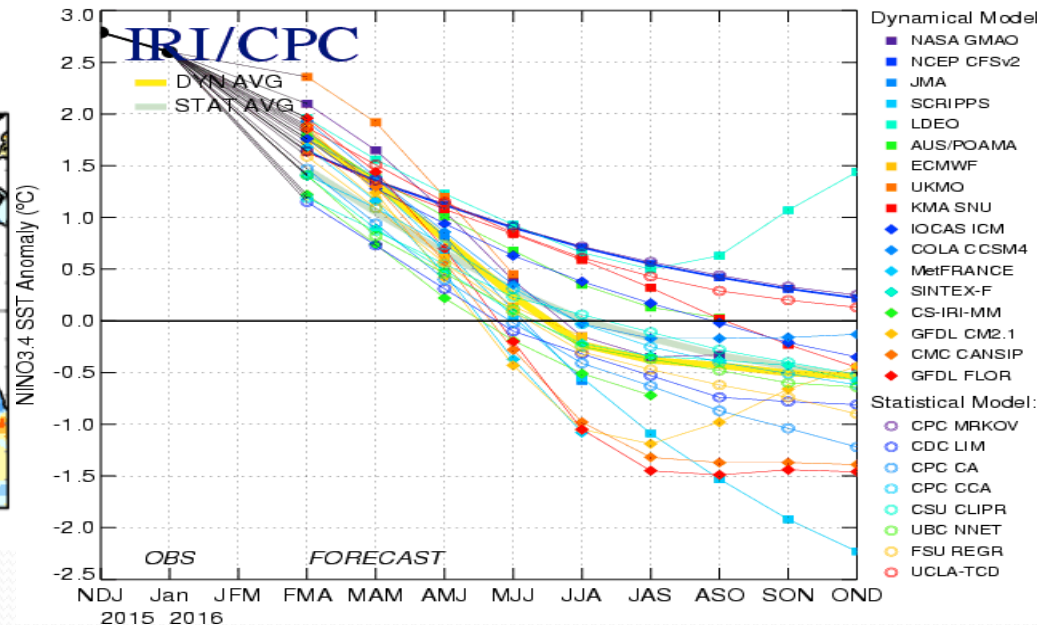
Change in Weekly SST Anoms (°C)
24FEB2016 minus 27JAN2016



Mid-Feb IRI/CPC Model-Based Probabilistic ENSO Forecast

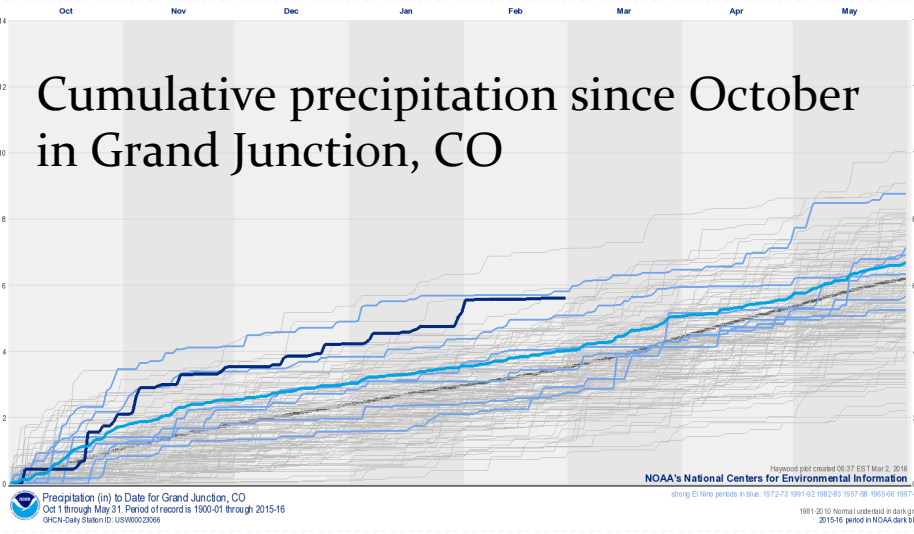


Mid-Feb 2016 Plume of Model ENSO Predictions

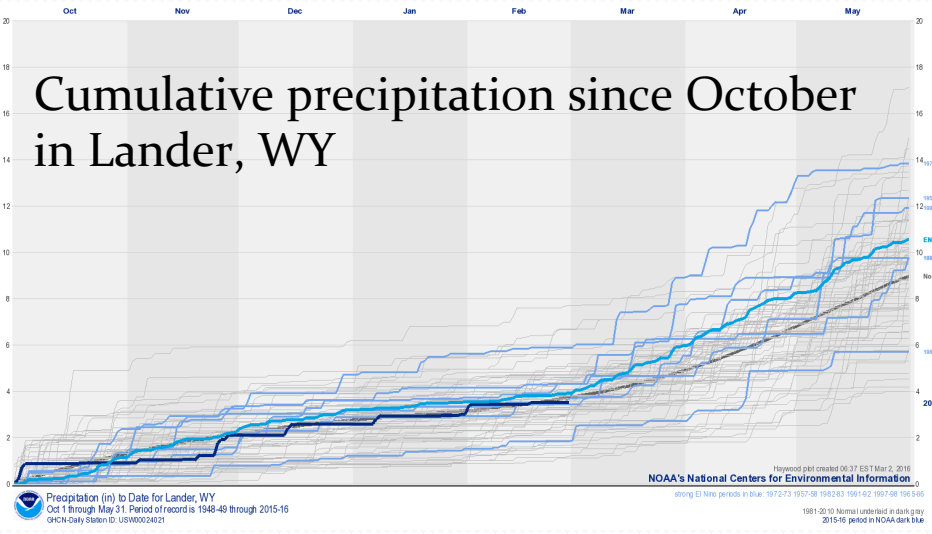


El Niño Impacts

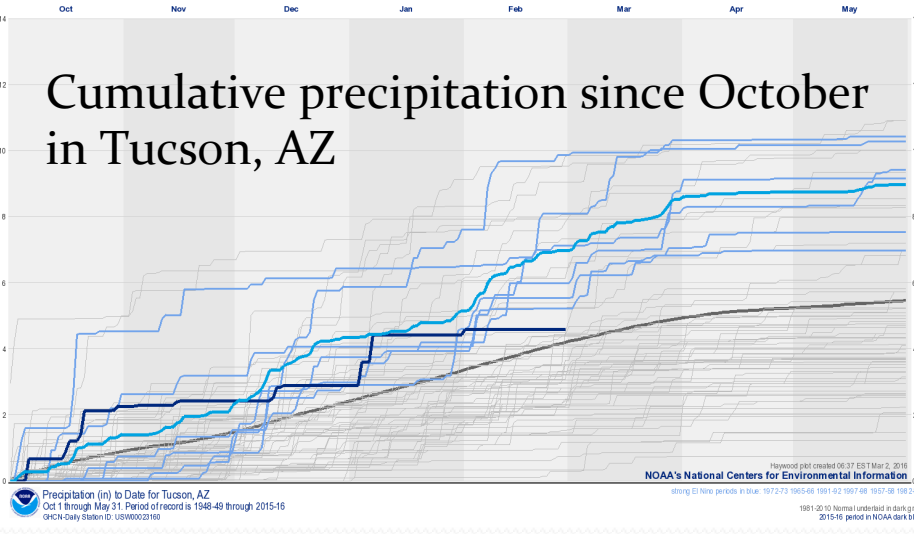
Cumulative precipitation since October in Grand Junction, CO



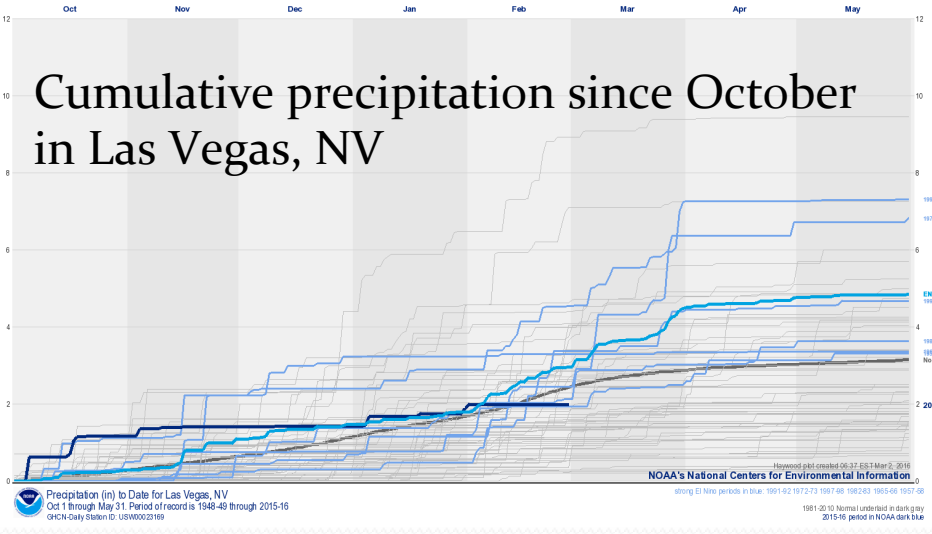
Cumulative precipitation since October in Lander, WY



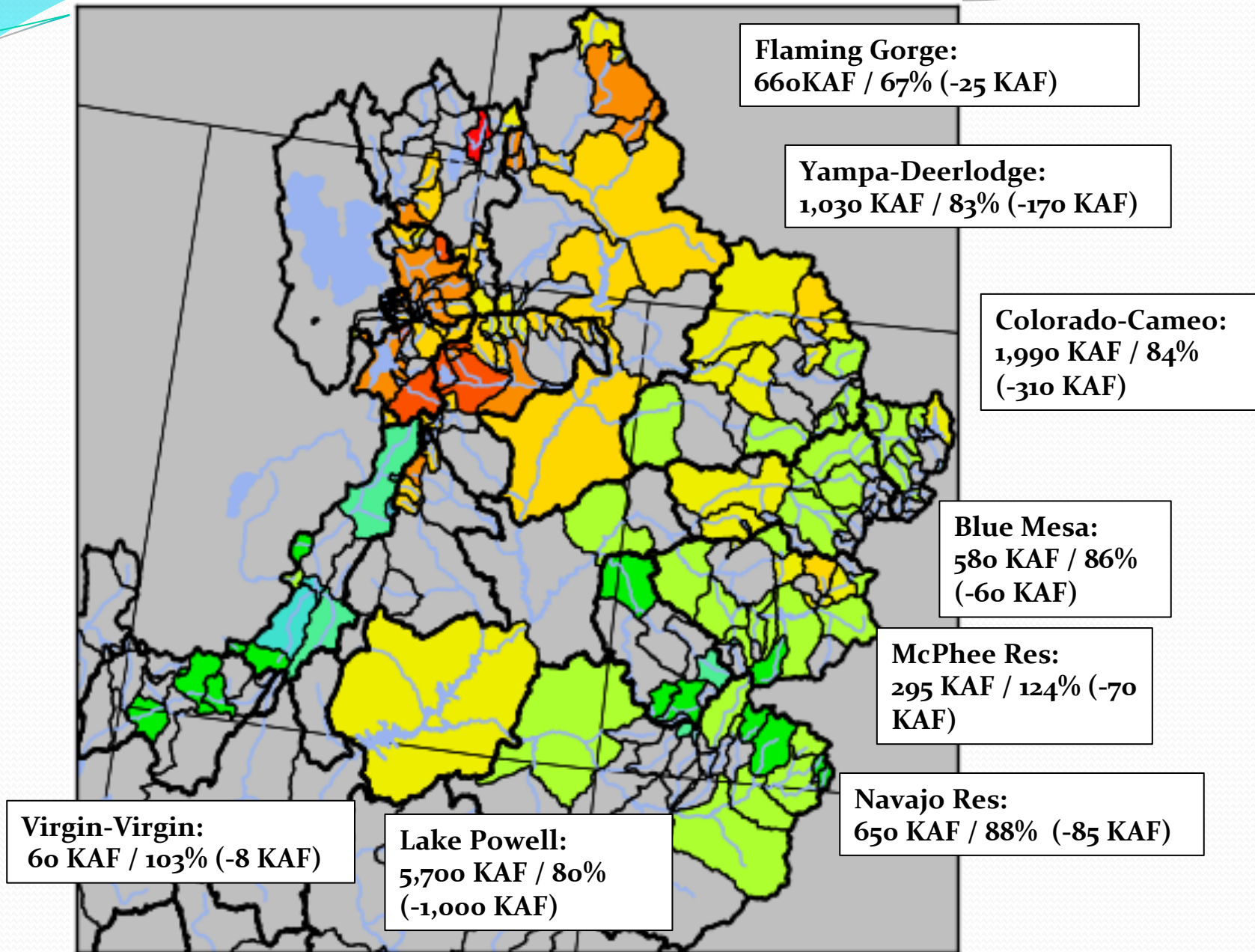
Cumulative precipitation since October in Tucson, AZ



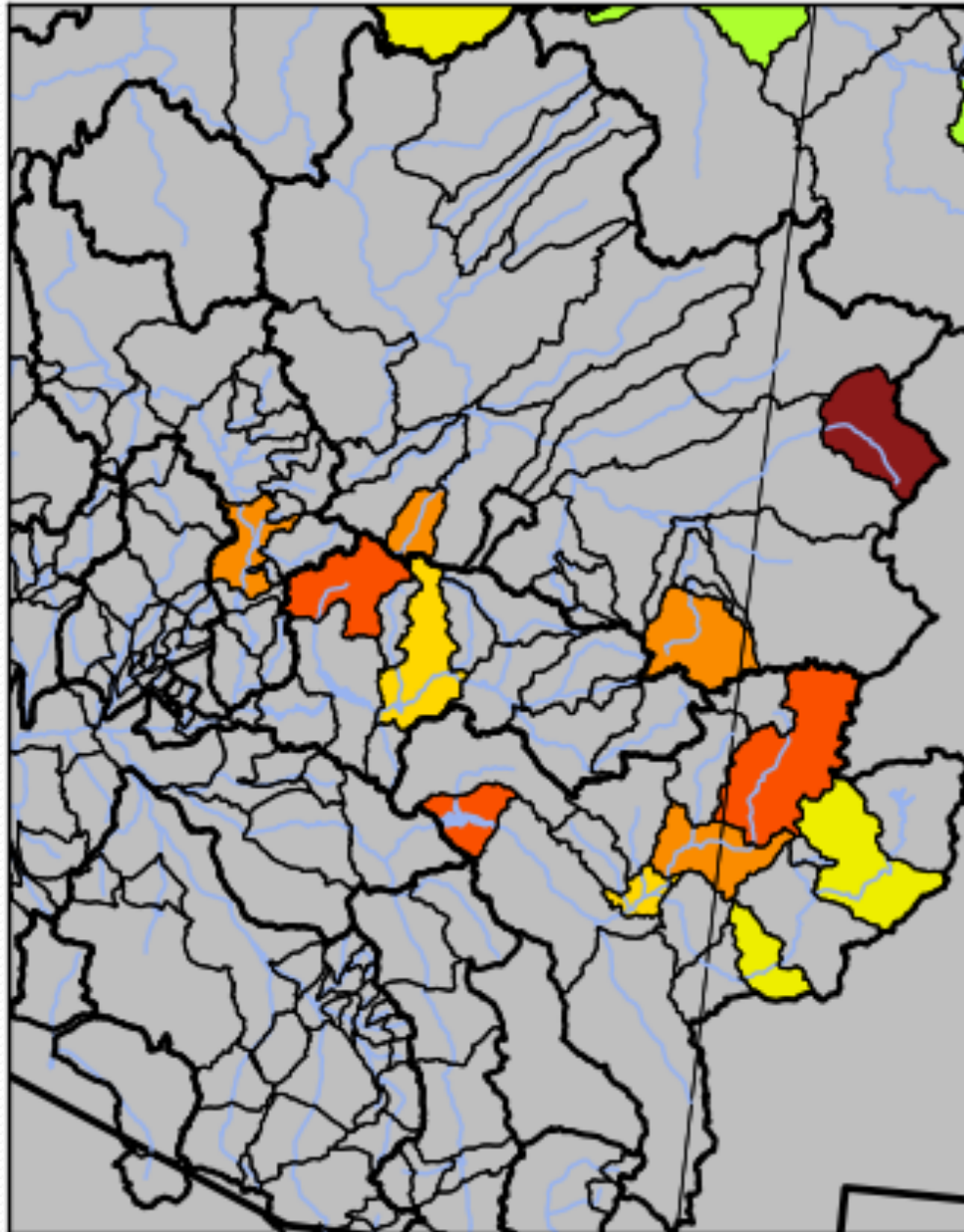
Cumulative precipitation since October in Las Vegas, NV



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



Jan-May Forecasted Streamflow Volumes (% of 1981-2010 median)



Little Colorado-Lyman:
9.1 KAF / 128% (Jan-Jun)

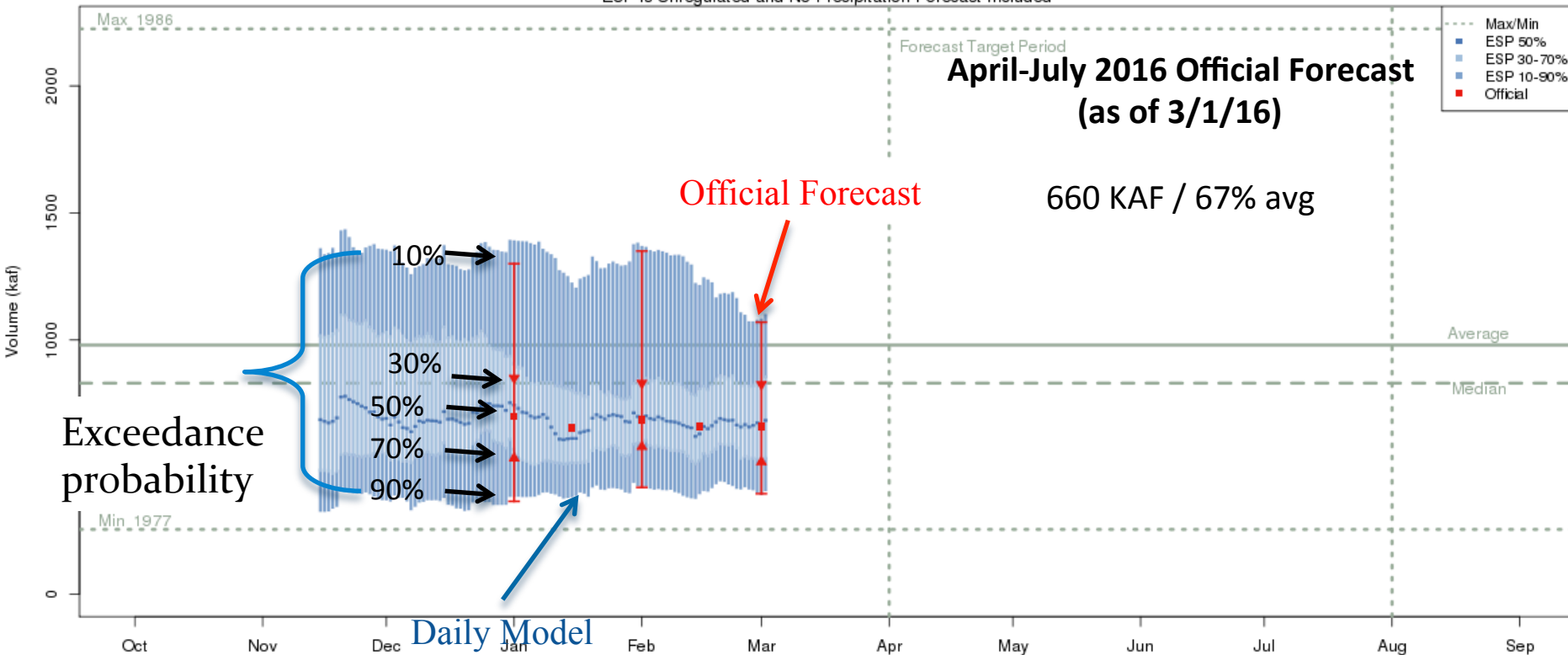
Verde-Horseshoe:
160 KAF / 102%

Salt - Roosevelt:
335 KAF / 108%

Gila-Gila:
65 KAF / 116%

Forecast Evolution Plot – Flaming Gorge

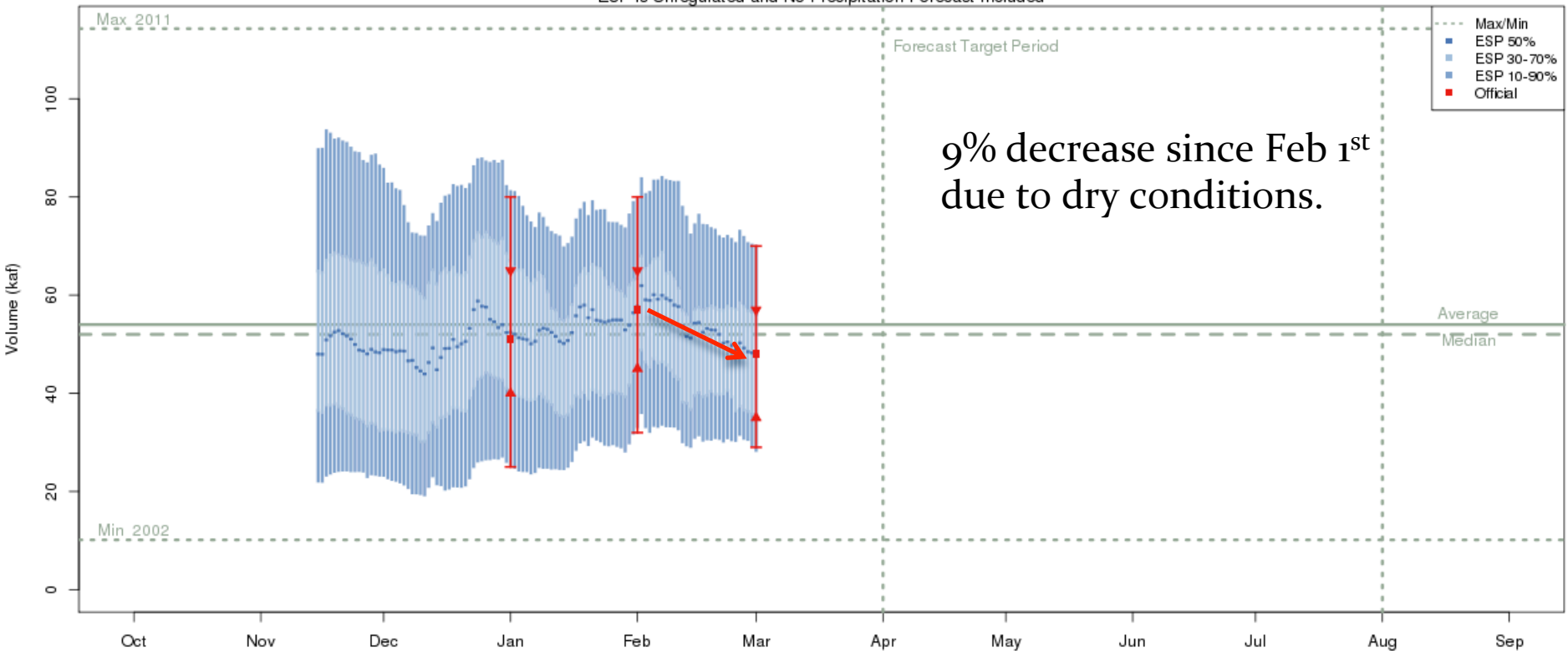
Green - Flaming Gorge Res- Flaming Gorge Dam- At (GRNU1)
 2016-03-01 Apr-Jul Official 50% Forecast: 660 kaf (67% of average)
 ESP is Unregulated and No Precipitation Forecast Included



The latest (2016-03-02) 50% ESP forecast is 683 kaf.
 Plot Created 2016-03-02 14:52:40, NOAA / NWS / CBRFC
 Forecasts in the forecast target period include observed values.

Forecast Evolution Plot – Wolford Mtn Reservoir

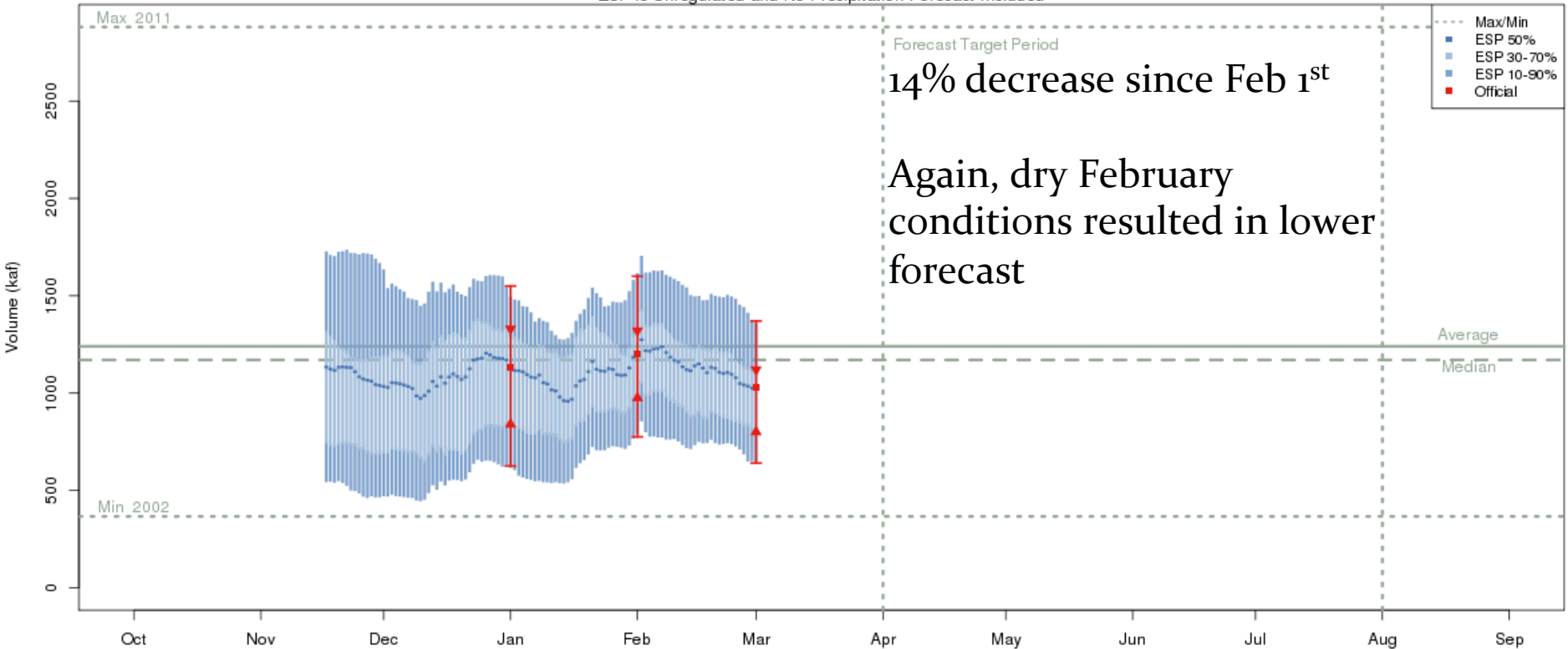
Muddy Ck - Wolford Mountain Reservoir (WORC2)
2016-03-01 Apr-Jul Official 50% Forecast: 48 kaf (89% of average)
ESP is Unregulated and No Precipitation Forecast Included



The latest (2016-03-01) 50% ESP forecast is 48 kaf.
Plot Created 2016-03-02 11:51:26, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

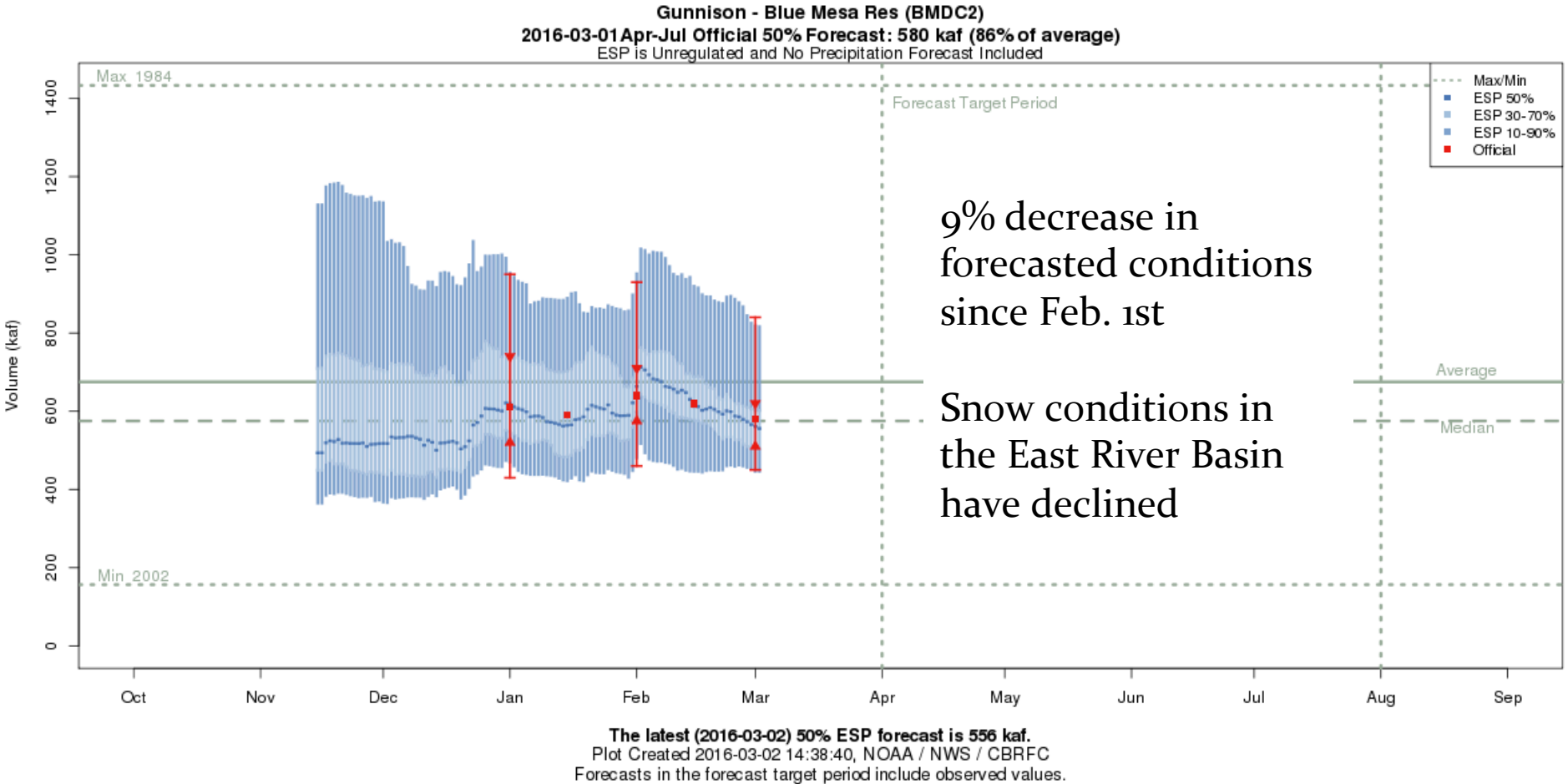
Forecast Evolution Plot – Yampa Deerlodge

Yampa - Deerlodge Park (YDLC2)
2016-03-01 Apr-Jul Official 50% Forecast: 1030 kaf (83% of average)
ESP is Unregulated and No Precipitation Forecast Included



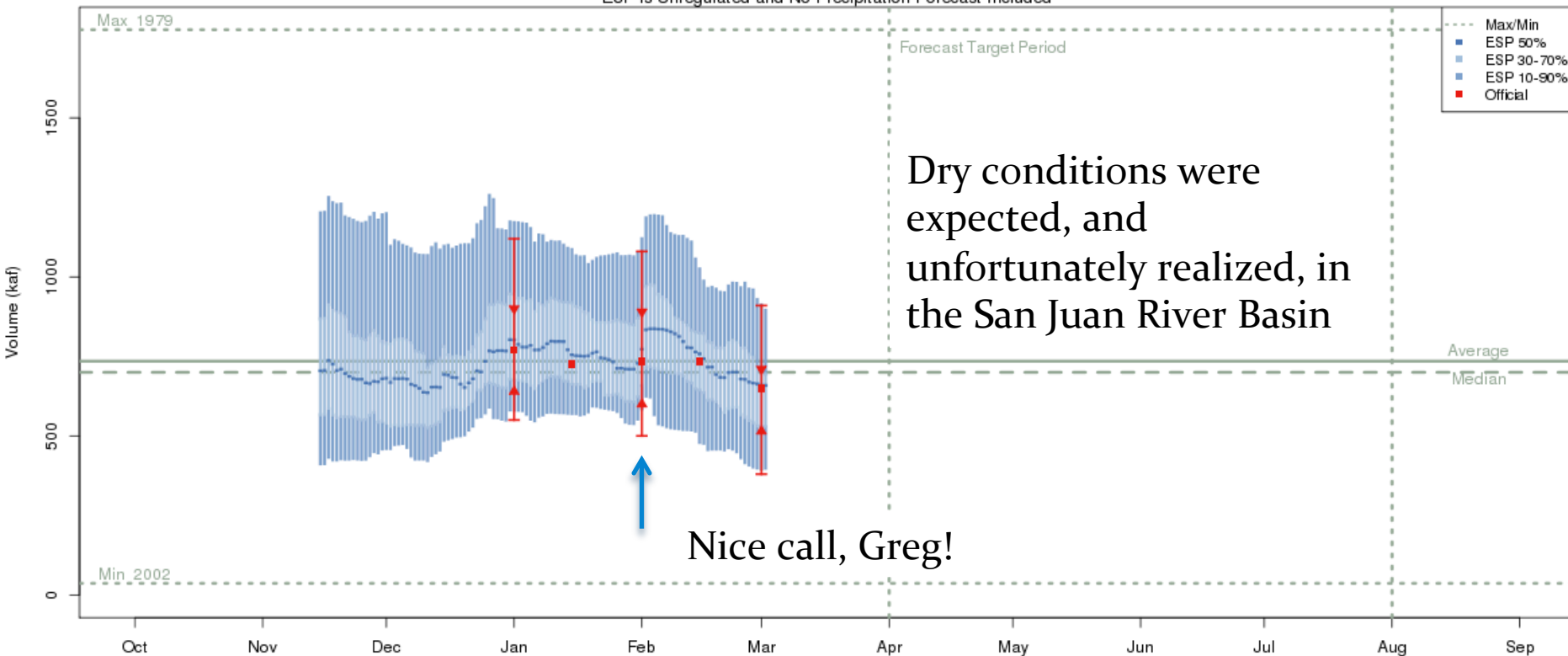
The latest (2016-03-01) 50% ESP forecast is 1020 kaf.
Plot Created 2016-03-02 11:39:25, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

Forecast Evolution Plot – Blue Mesa Reservoir



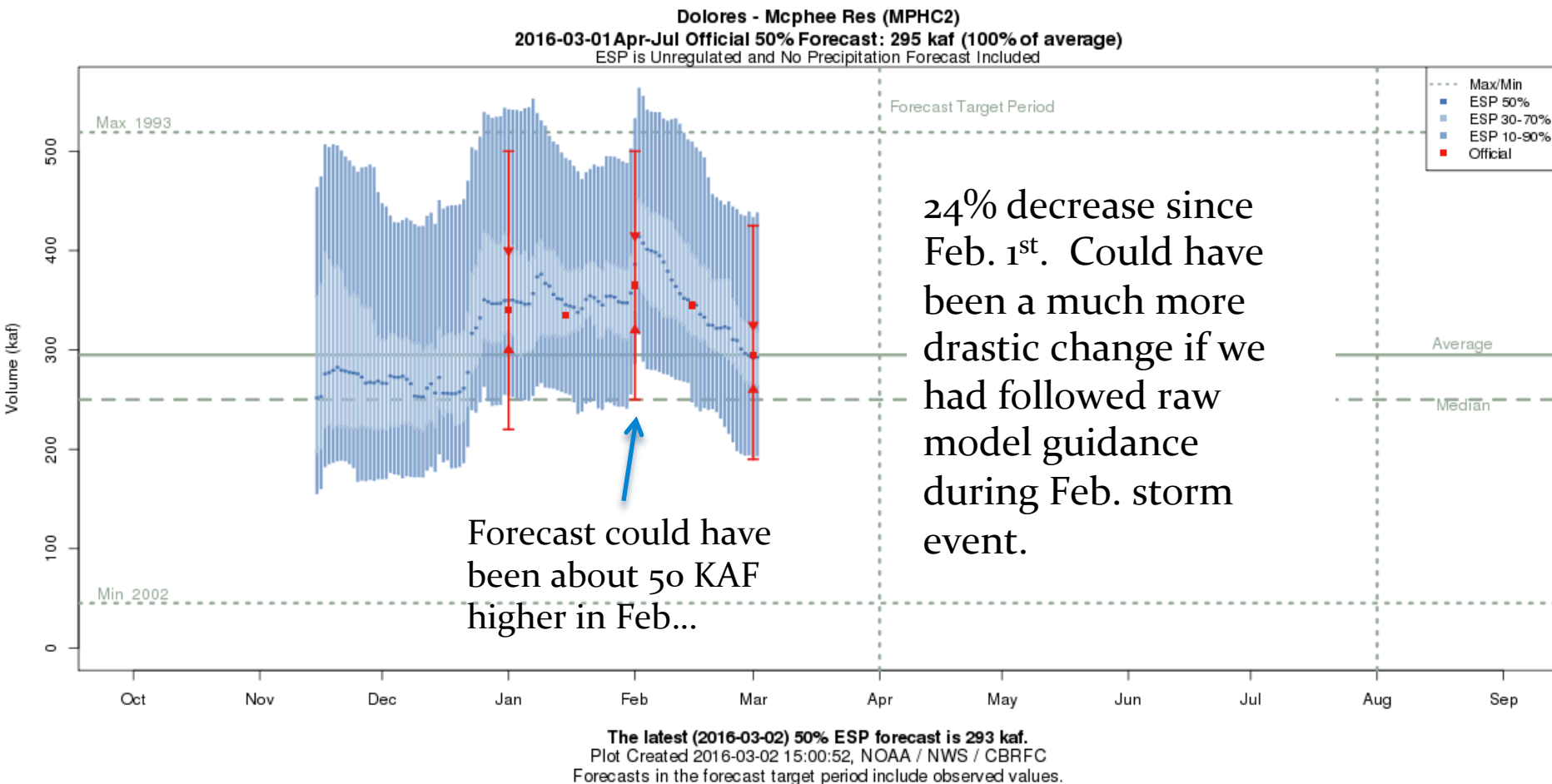
Forecast Evolution Plot – Navajo Reservoir

San Juan - Navajo Res- Archuleta- Nr (NVRN5)
2016-03-01 Apr-Jul Official 50% Forecast: 650 kaf (88% of average)
ESP is Unregulated and No Precipitation Forecast Included

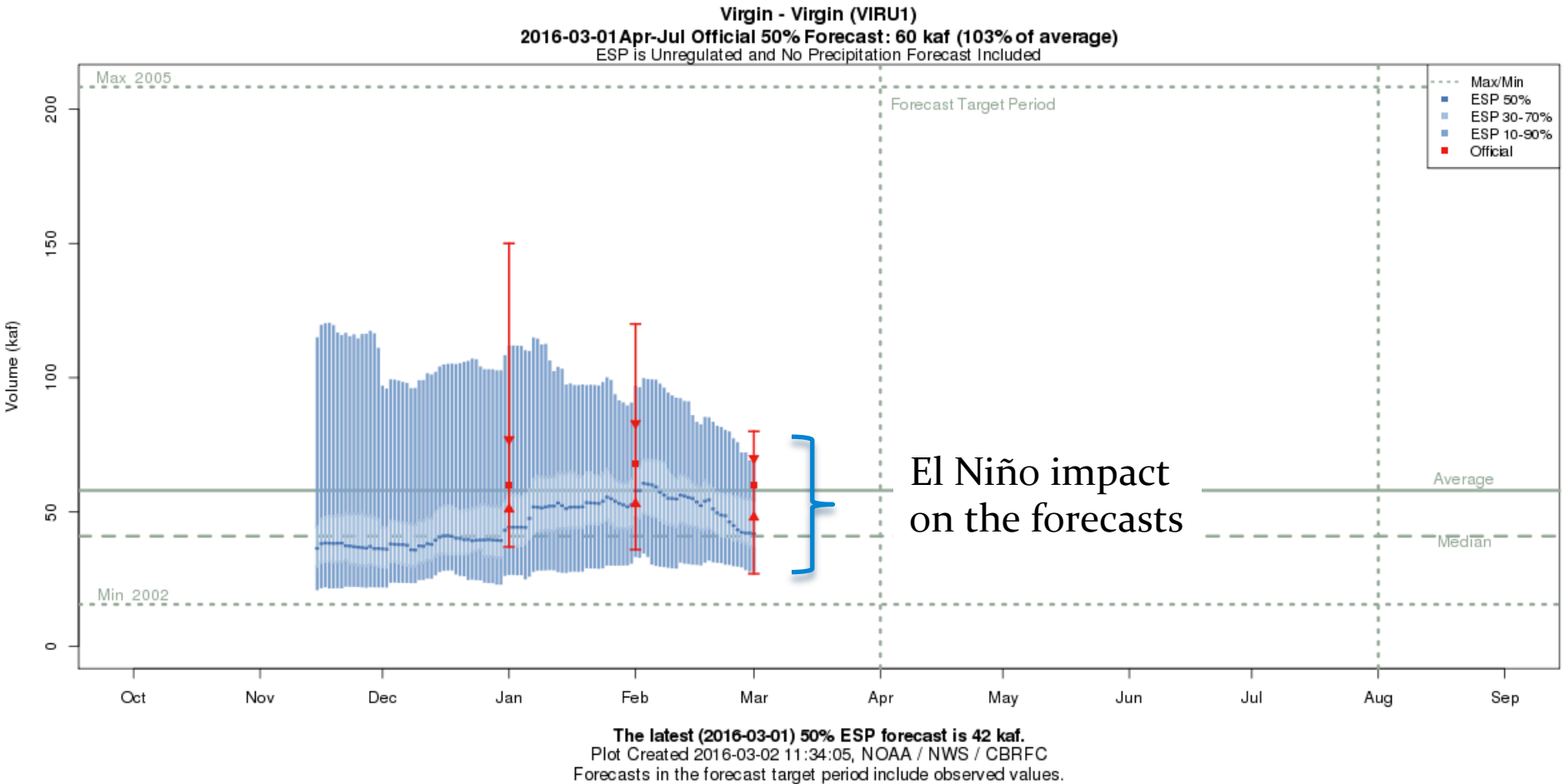


The latest (2016-03-02) 50% ESP forecast is 659 kaf.
Plot Created 2016-03-02 15:02:15, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

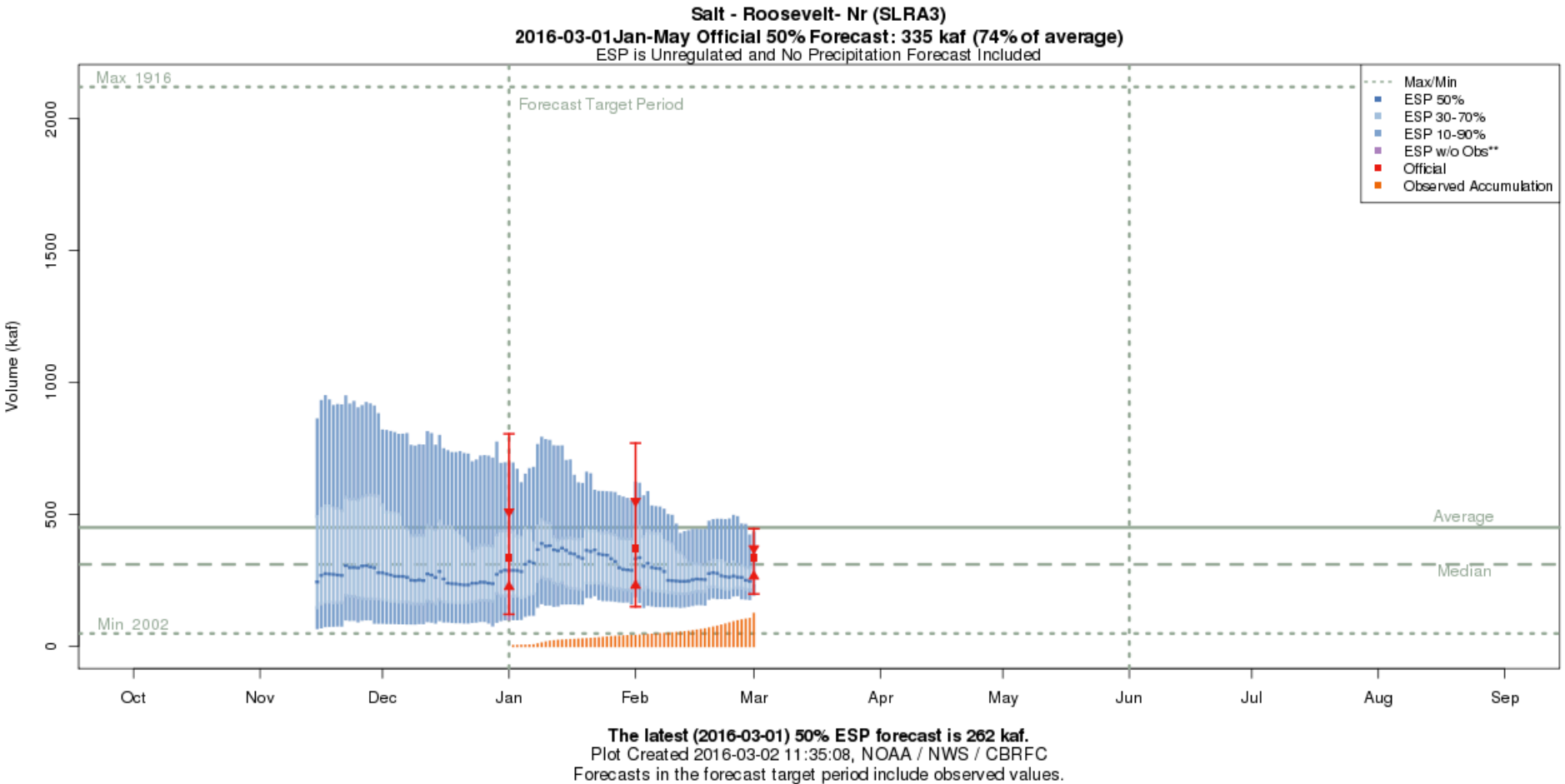
Forecast Evolution Plot – McPhee Reservoir



Forecast Evolution Plot – Virgin River

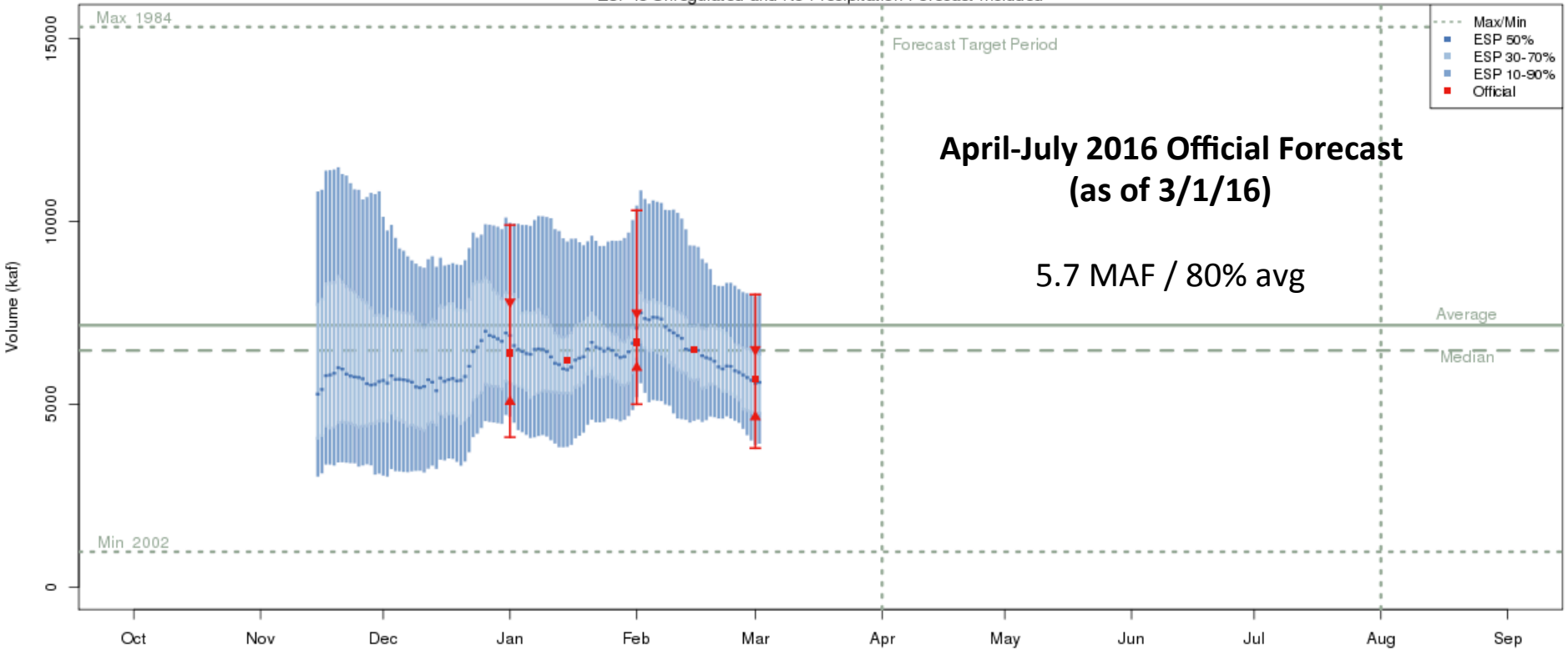


Forecast Evolution Plot – Salt River-Roosevelt Res



Forecast Evolution Plot – Lake Powell

Colorado - Lake Powell- Glen Cyn Dam- At (GLDA3)
2016-03-01 Apr-Jul Official 50% Forecast: 5700 kaf (80% of average)
ESP is Unregulated and No Precipitation Forecast Included

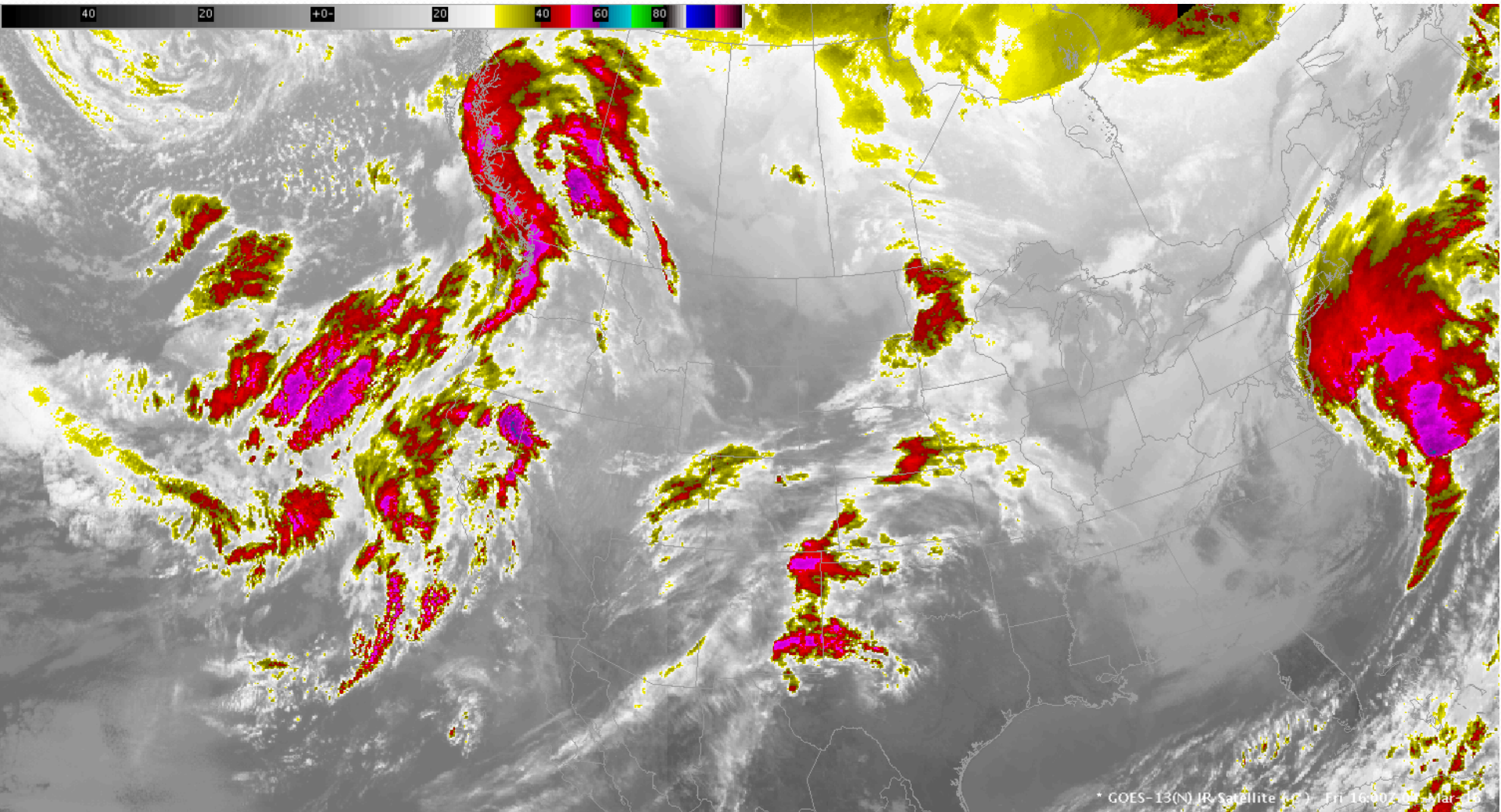


The latest (2016-03-02) 50% ESP forecast is 5597 kaf.
Plot Created 2016-03-02 14:51:32, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.

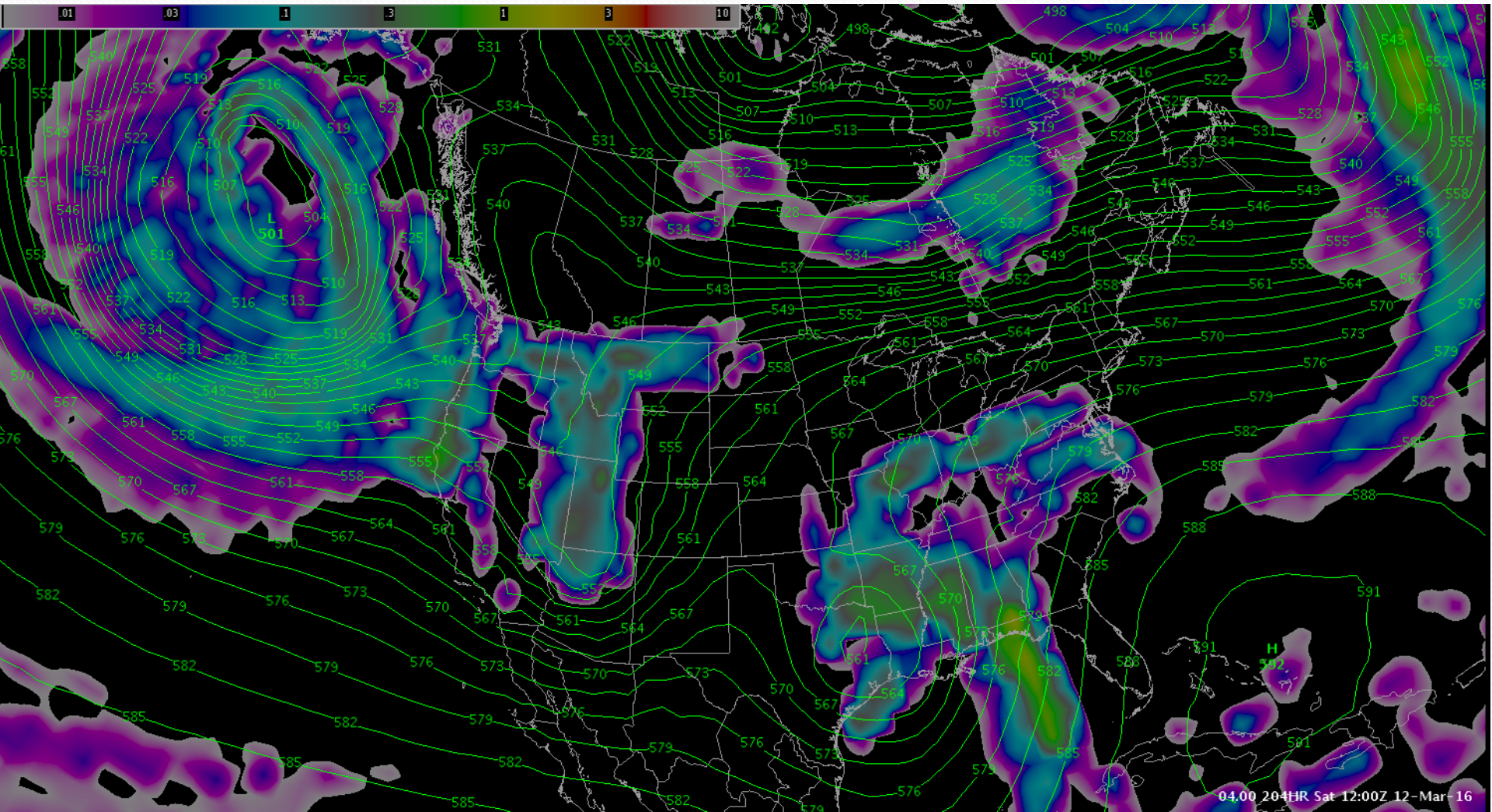
Forecast Impacts Summary

- A historically dry February resulted in reductions to forecasted April through July runoff volumes throughout the Colorado River Basin
 - Warm temperatures resulted in some low elevation areas experiencing snowmelt events
 - Unrealized precipitation, particularly in the Lower Colorado River Basin, further reduced forecasted volumes
- Snowpack conditions were generally above normal at the beginning of February, but have now declined to near to below normal conditions throughout much of Colorado. Below normal conditions in the Green River Basin and portions of the San Juan River Basin are apparent
- El Niño conditions are weakening and are expected to return to neutral conditions by late Spring. La Niña conditions could develop by late Fall

A strong storm system is, and will continue, impacting California over the next few days; remnants of this storm system are expected over the Upper Colorado River Basin Sunday and Monday, but is only expected to bring 0.5" to 1" of water to the region.



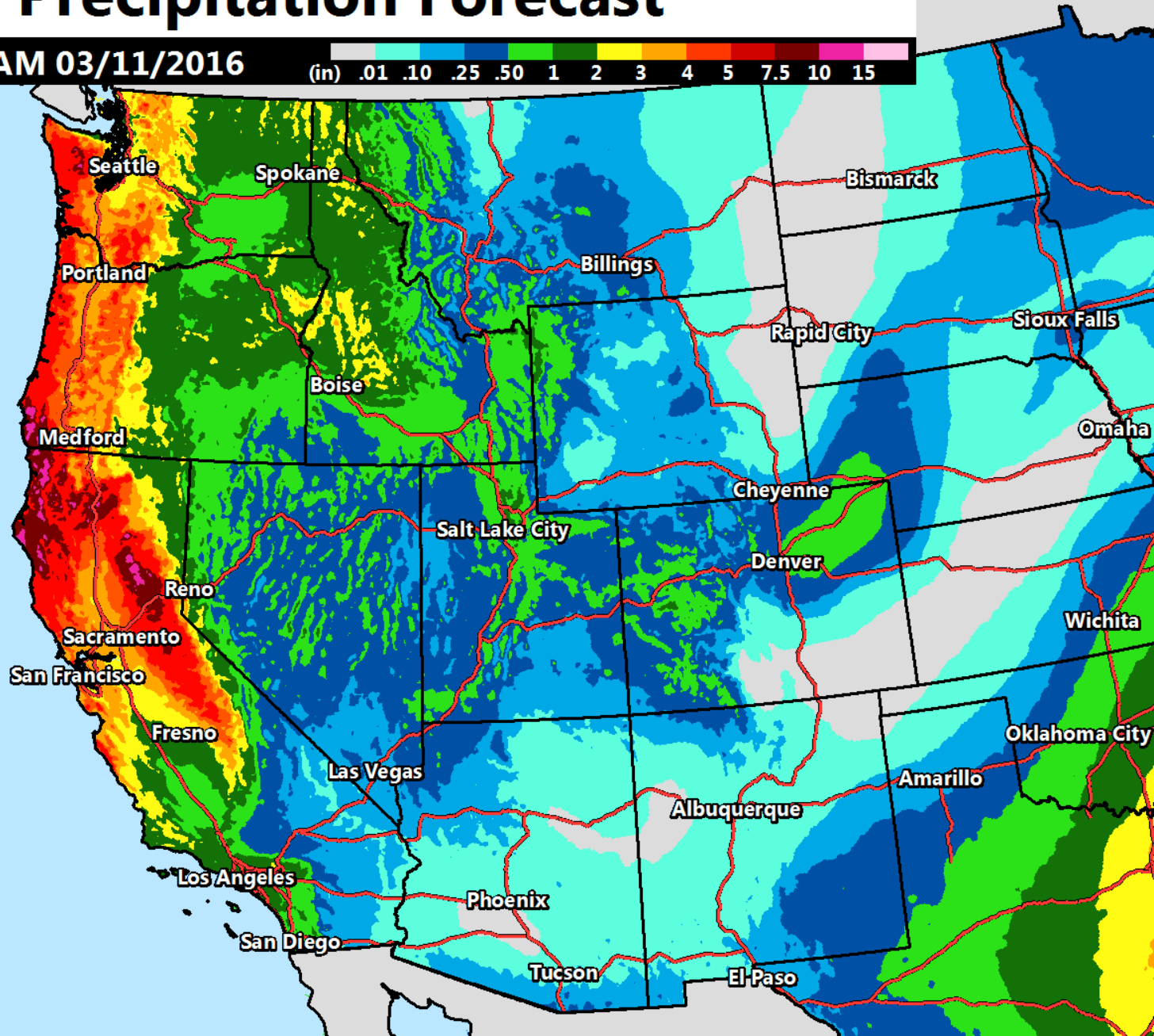
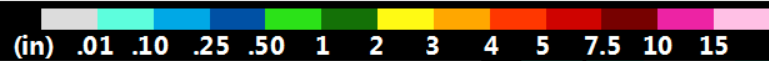
Next chance for significant precipitation is around March 12th, when a low pressure system may develop over Utah, which could bring precipitation to the Upper Colorado River Basin region for a couple days before setting up a possibly active month?





7-Day Precipitation Forecast

Through 4AM 03/11/2016

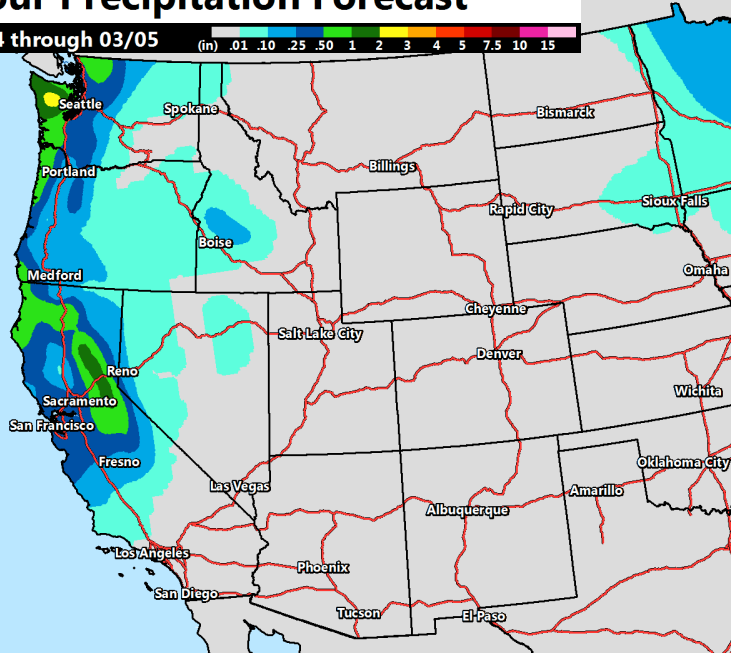
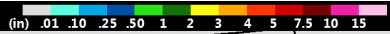


March 4, 2016 Forecast



24-Hour Precipitation Forecast

4AM 03/04 through 03/05

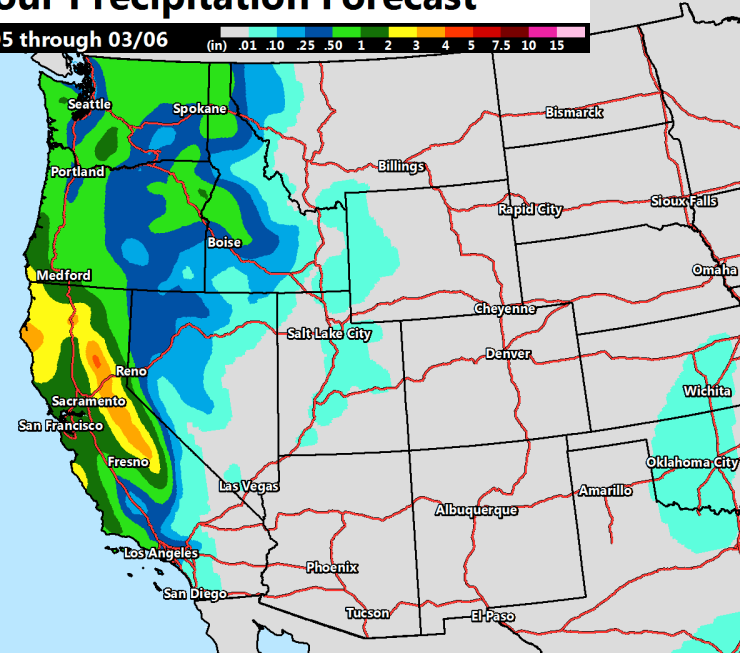
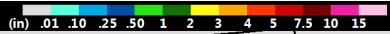


March 4, 2016 Forecast



24-Hour Precipitation Forecast

4AM 03/05 through 03/06

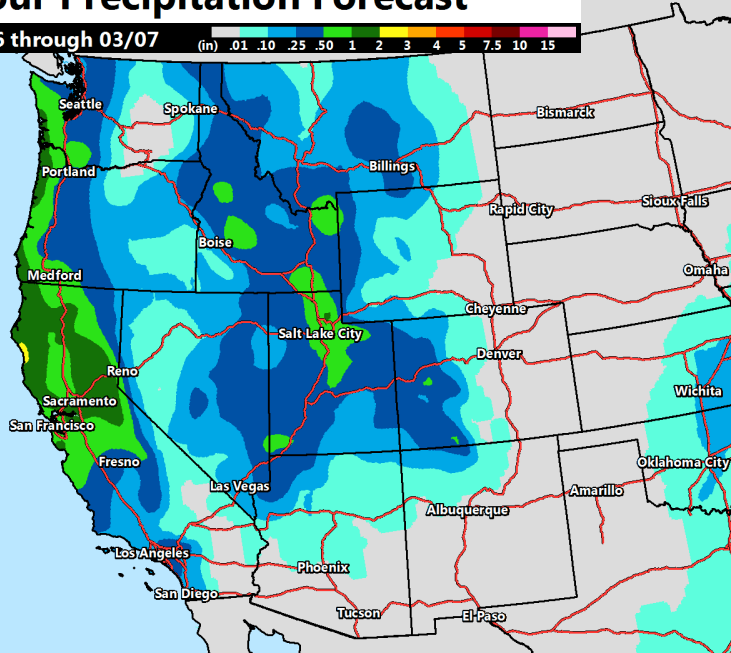
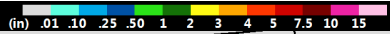


March 4, 2016 Forecast



24-Hour Precipitation Forecast

4AM 03/06 through 03/07

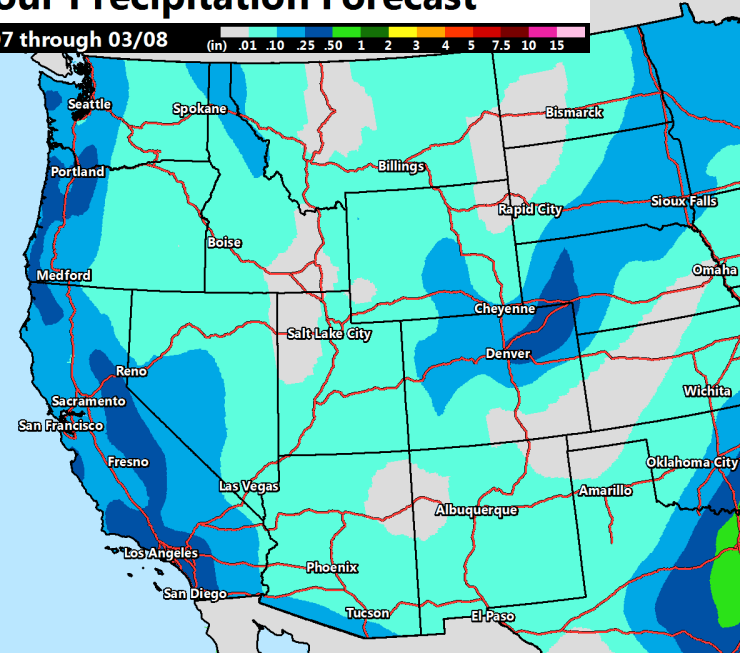
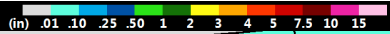


March 4, 2016 Forecast



24-Hour Precipitation Forecast

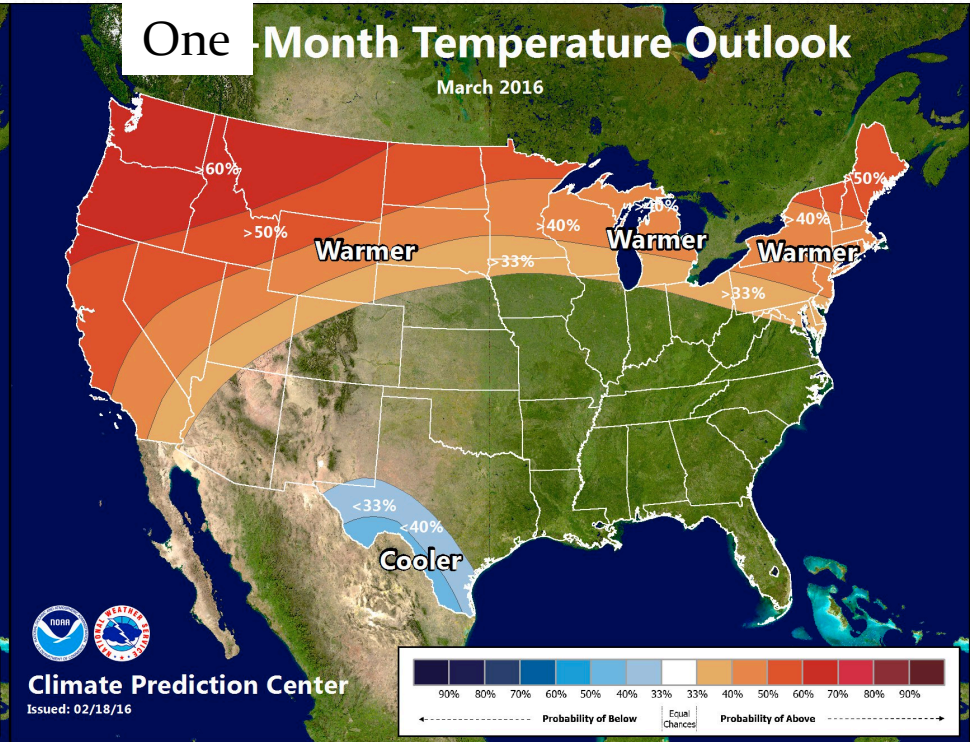
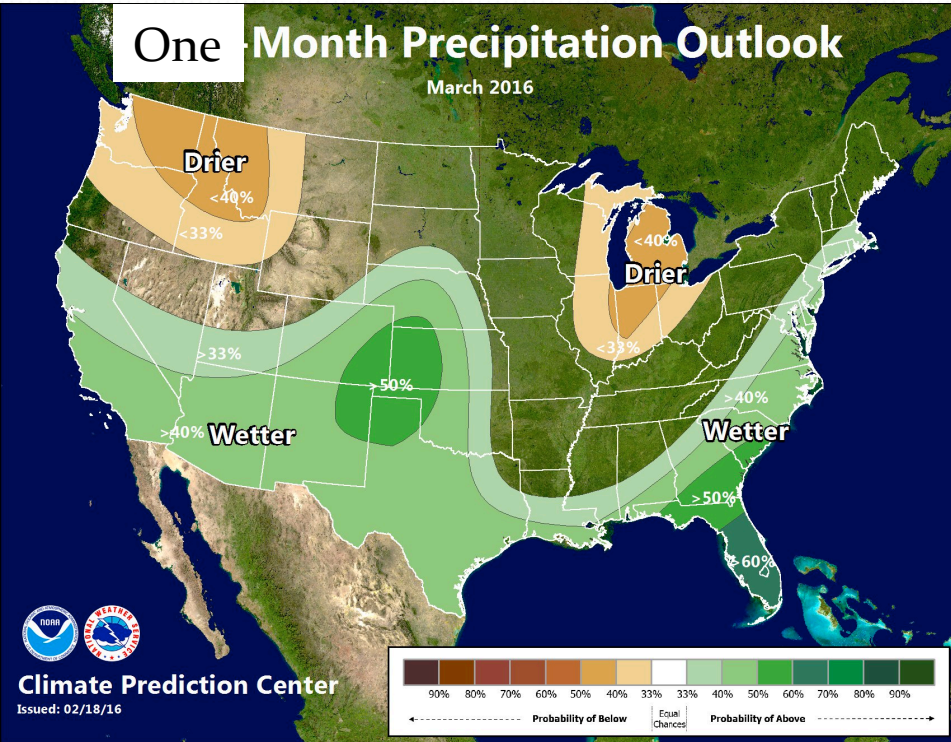
4AM 03/07 through 03/08



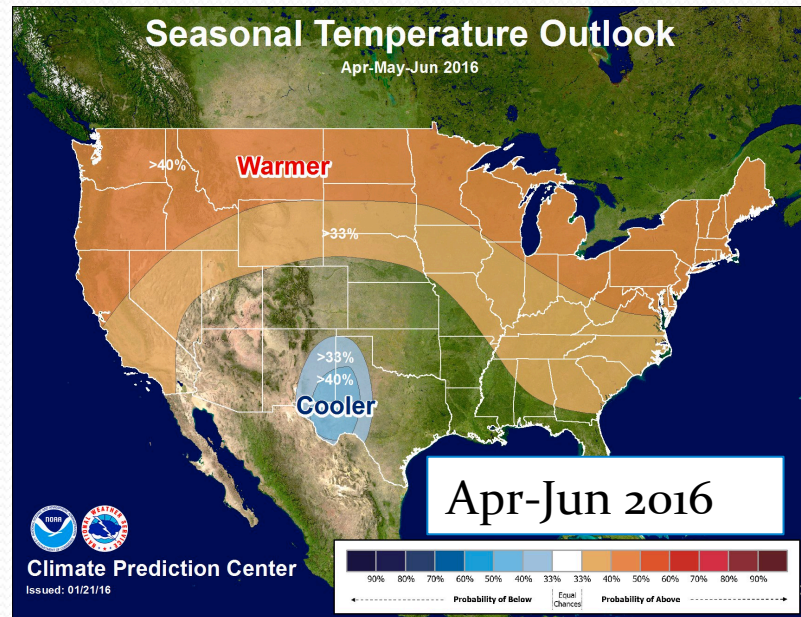
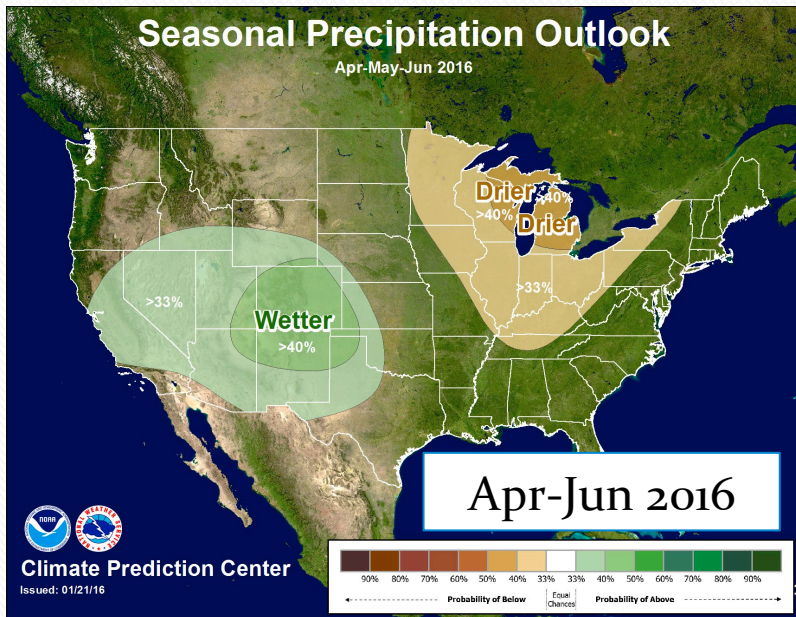
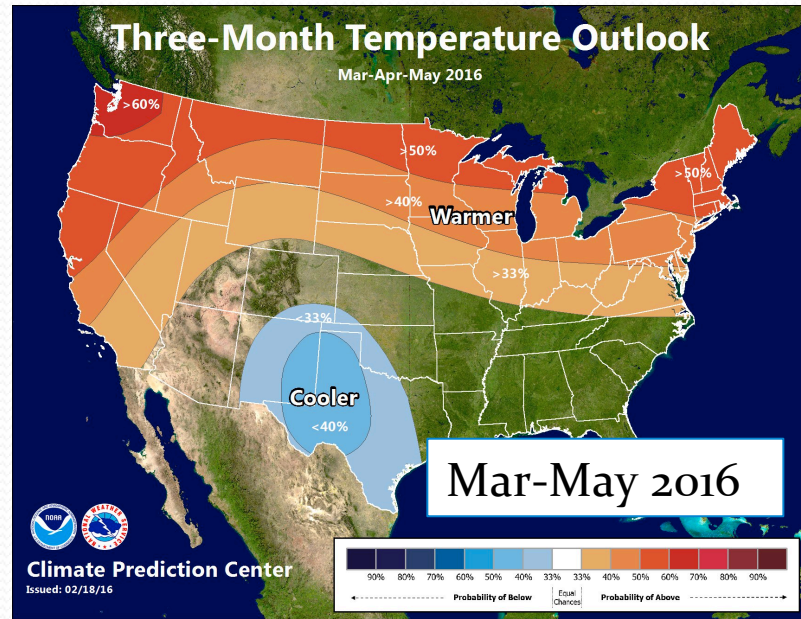
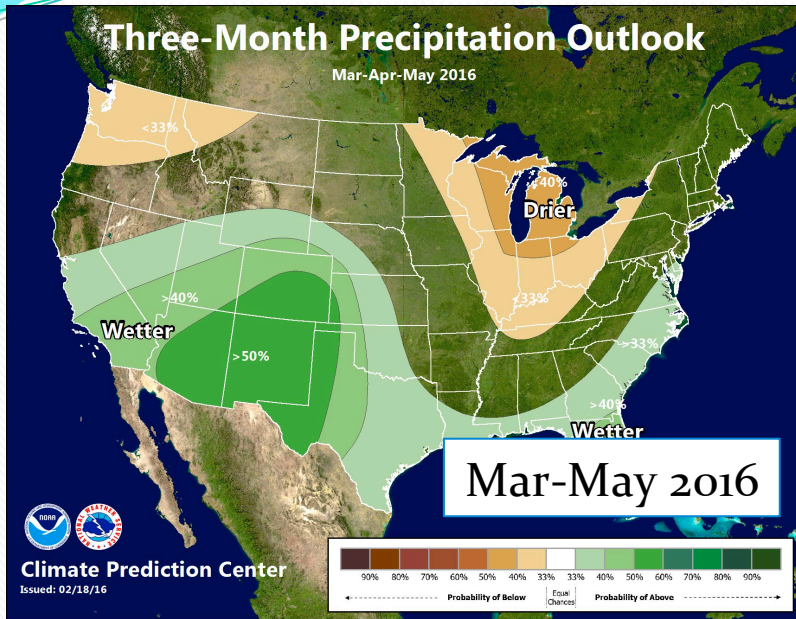
March 4, 2016 Forecast

Long Range Outlook

Climate Prediction Center 30 day outlook for March 2016



Climate Prediction Center – 3 month outlooks



2016 water supply briefings

- Upcoming briefings
 - Great Basin Water Supply Briefing, Monday, March 7th at 10 am MST
 - Register at: <https://attendee.gotowebinar.com/register/361615453413284866>
 - Peak Flows Briefing, Thursday, March 10th at 11 am MST
 - Register at: <https://attendee.gotowebinar.com/register/5281542959754327809>
 - Full briefing schedule:
 - <http://www.cbrfc.noaa.gov/news/wswwebinar2016.html>
- We did a live demo using some of the new features of our webpage – we'll do this again in the future. Let us know what you want to see!
- Date/Times are subject to change. All registration information is posted on the CBRFC web page.

CBRFC Contacts

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