

CBRFC  
January 2015  
Water Supply Webinar

January 8, 2015

Greg Smith

# Water Supply Webinars

- Focus on the forecast drivers
  - Basin conditions, model states, future weather
- Provide the big picture view of runoff expectations
- Highlight the unique and out of the ordinary
- Opportunity to provide insight into our forecast process
  - Data interpretation, climate issues, new technology, etc.
- Continue to modify webinars to meet needs and be informative
  - UC webinar and Great Basin webinar?

5 brief webinar survey questions at the end

# January Water Supply Webinar

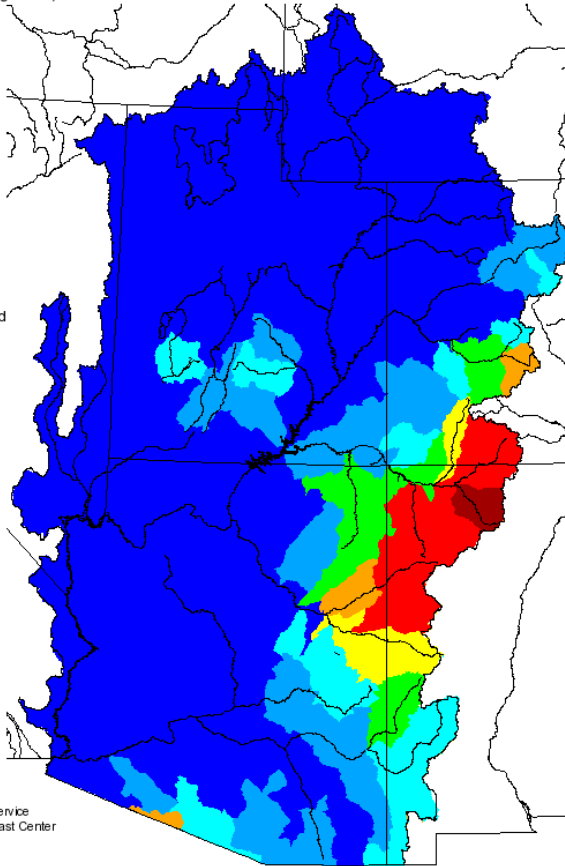
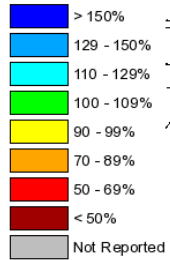
- Fall / winter weather
- Current conditions driving the forecasts
  - Soil Moisture, Snow Conditions
- Water supply forecasts
- Insight: SNOTEL Elevation vs Flow Contribution
- Upcoming weather (short and long term)

# Late Summer / Fall Precipitation

## Monthly Precipitation for August 2014

(Averaged by Hydrologic Unit)

### % Average

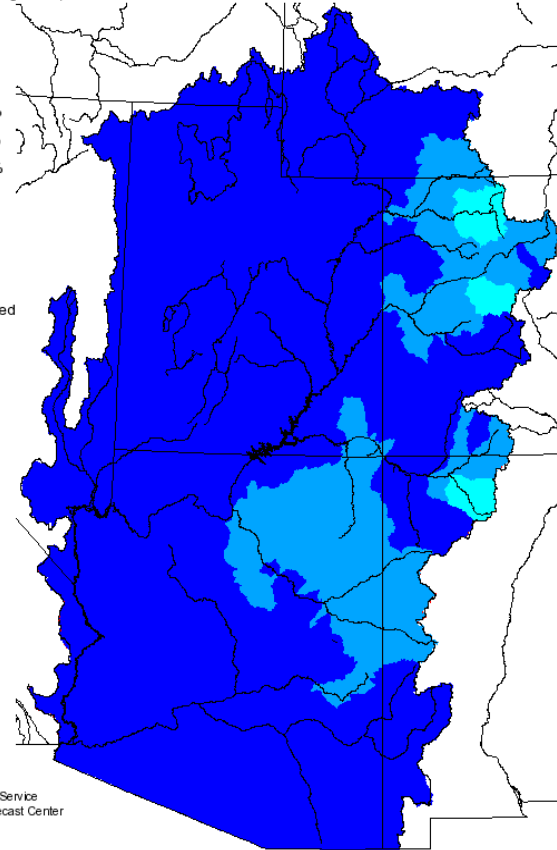
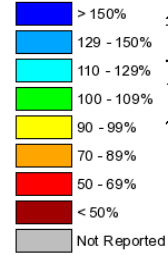


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Colorado Basin River Forecast Center  
Salt Lake City, Utah  
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## Monthly Precipitation for September 2014

(Averaged by Hydrologic Unit)

### % Average



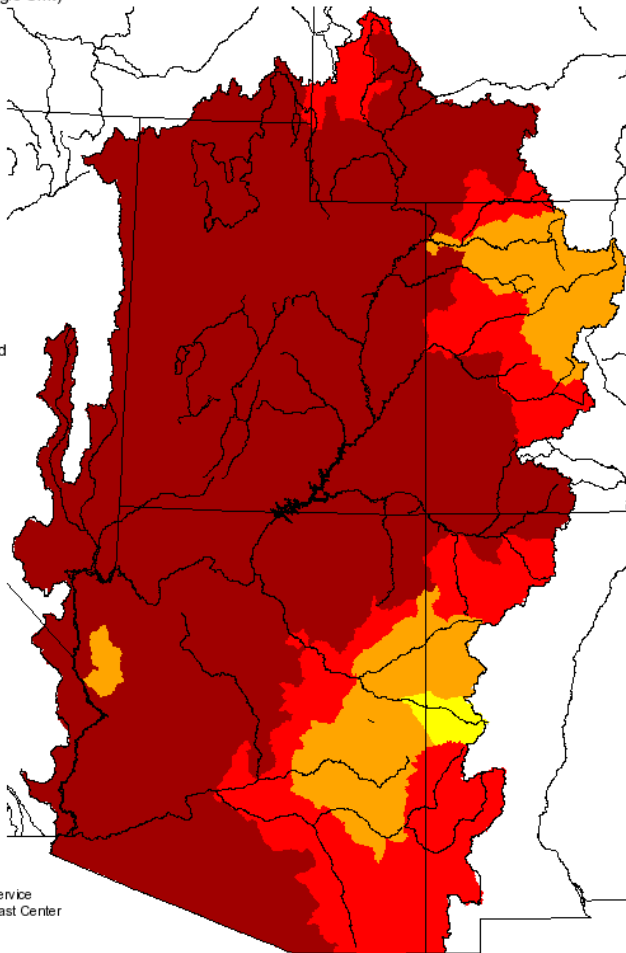
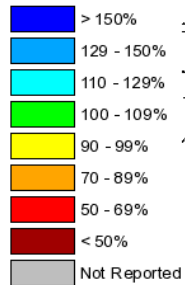
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# Fall Precipitation

## Monthly Precipitation for October 2014

(Averaged by Hydrologic Unit)

### % Average

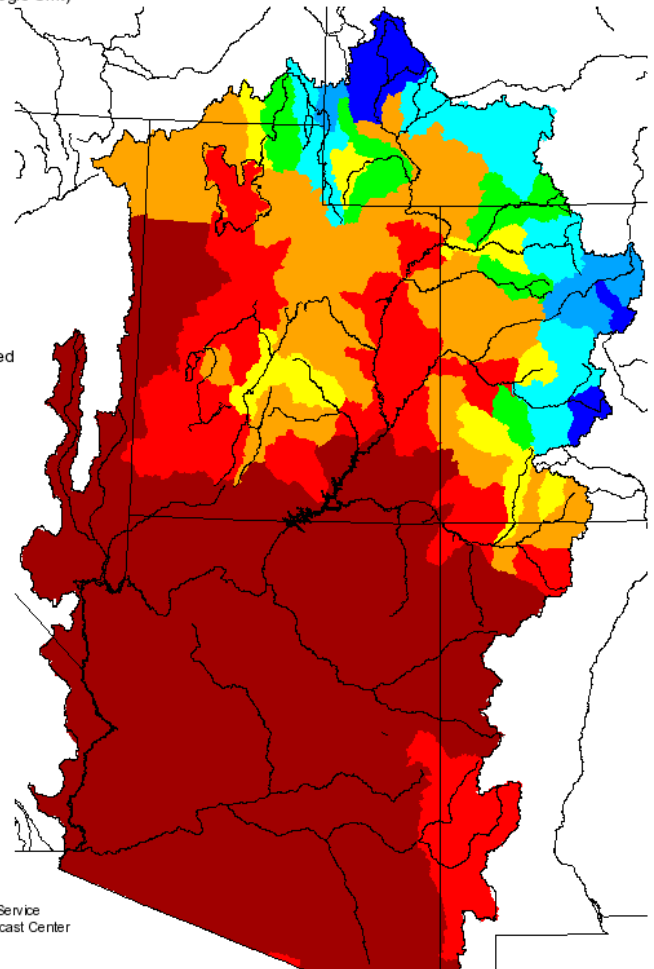
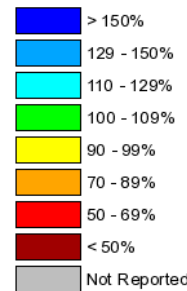


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## Monthly Precipitation for November 2014

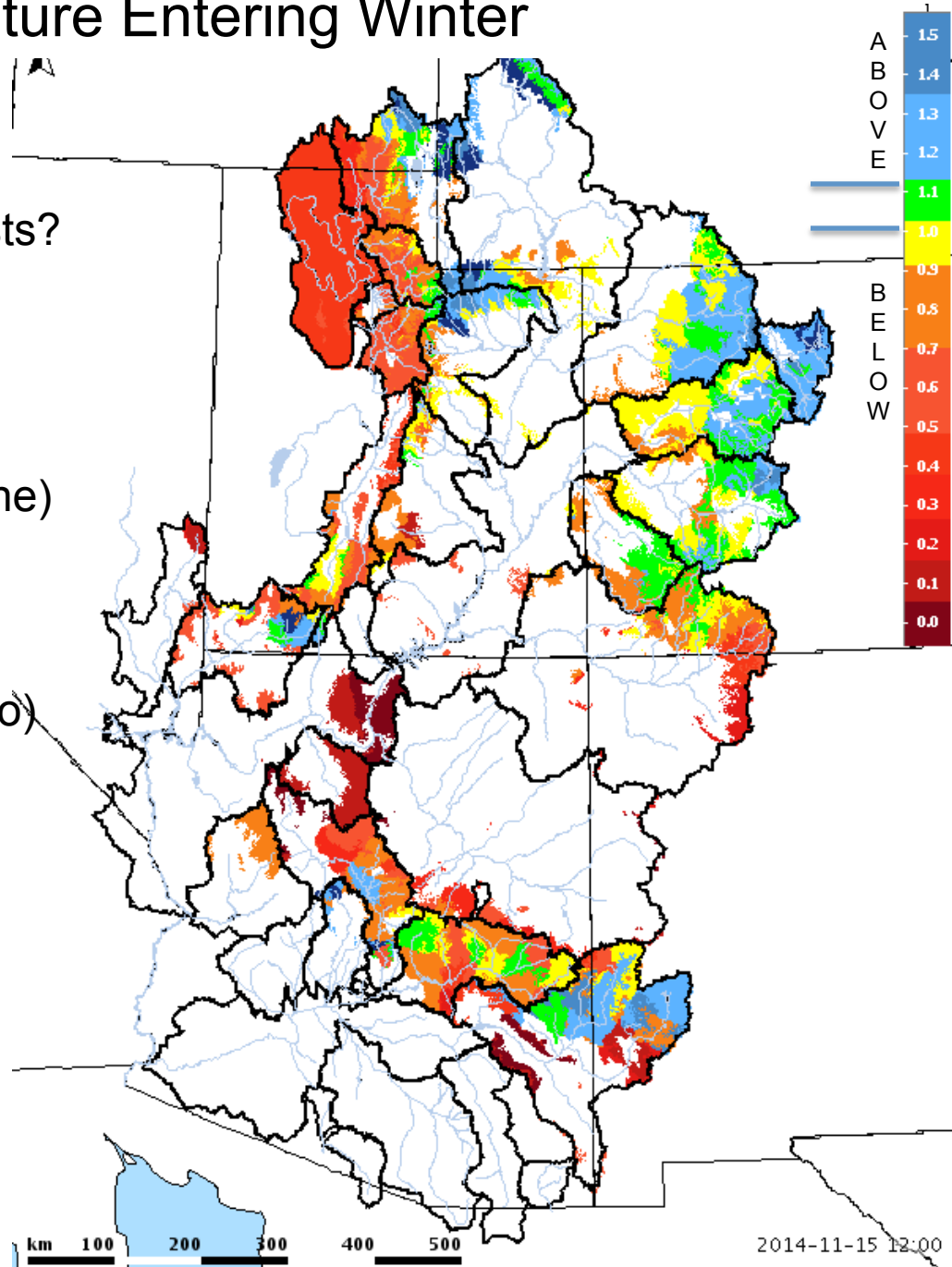
(Averaged by Hydrologic Unit)

### % Average



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# Model Soil Moisture Entering Winter



How will this affect water supply forecasts?

Positive:

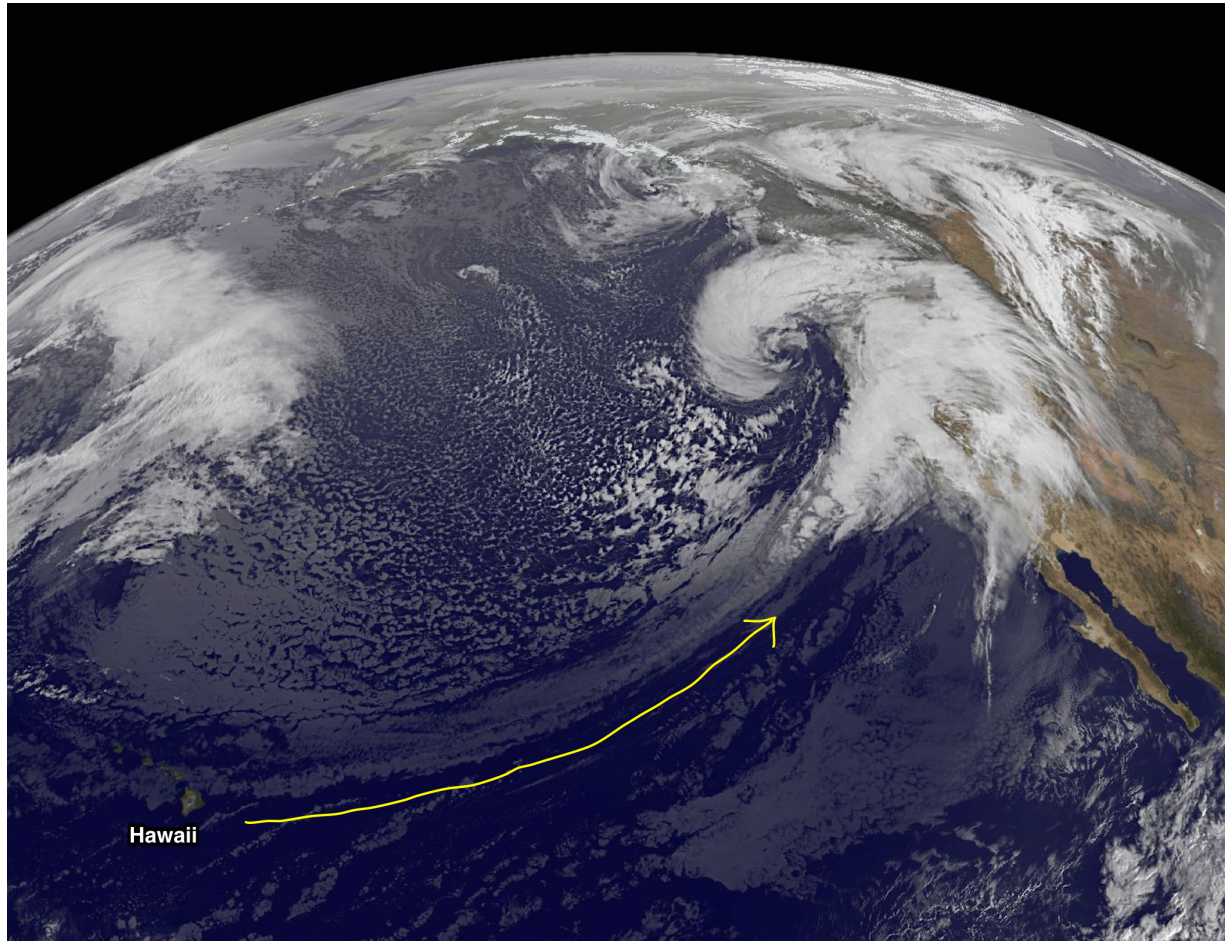
- Green above Fontenelle
- Colorado above Kremmling
- Uinta Range (Bear, Provo, Duchesne)
- Parts of Yampa, White, Gunnison

Negative:

- Northern Great Basin (Weber, Provo)
- Sevier
- San Juan
- Virgin
- Lower Colorado Basins

# December 2014 Weather

Mild temperatures – December ended up warmer than average  
Moist and mild air mass – Pacific/Sub-Tropical source  
Precipitation varied but generally near to above average  
Arctic air arrived to end the month – Low elevation snow



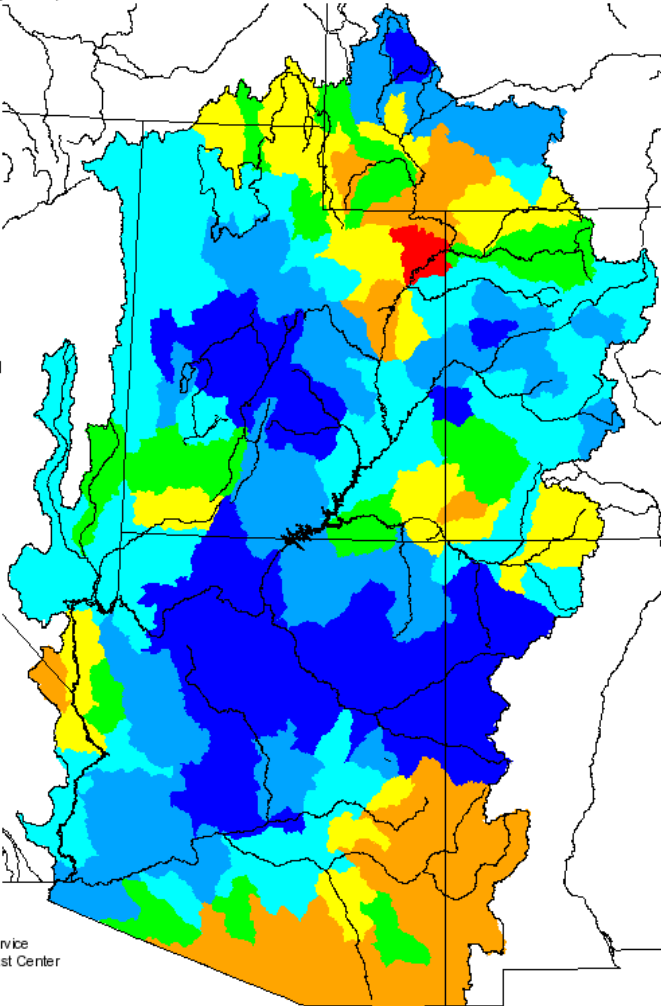
# December / Water-Year Precipitation

## Monthly Precipitation for December 2014

(Averaged by Hydrologic Unit)

### % Average

- > 150%
- 129 - 150%
- 110 - 129%
- 100 - 109%
- 90 - 99%
- 70 - 89%
- 50 - 69%
- < 50%
- Not Reported



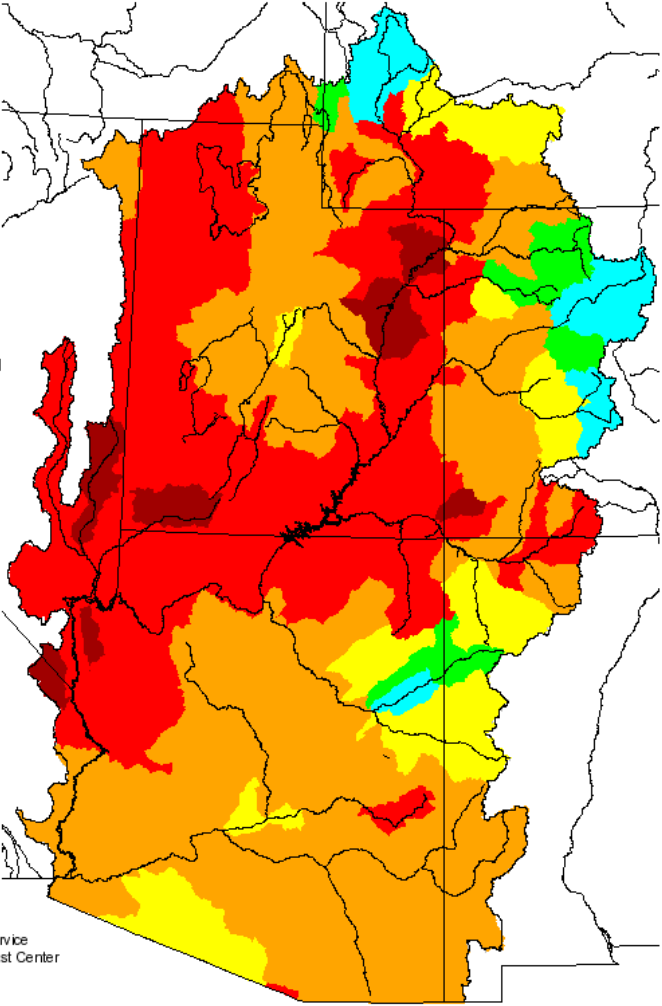
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## Seasonal Precipitation, October 2014 - December 2014

(Averaged by Hydrologic Unit)

### % Average

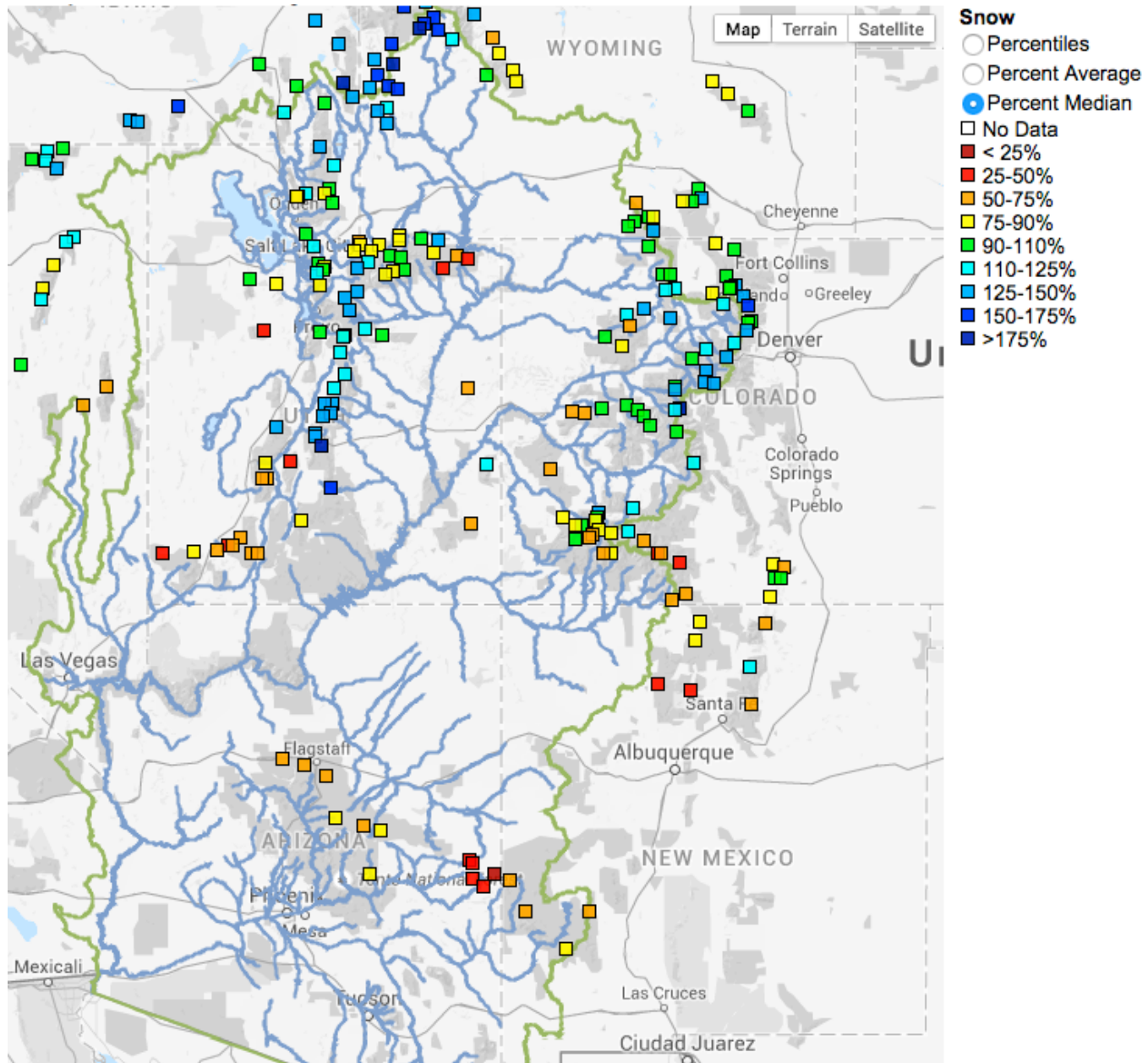
- > 150%
- 129 - 150%
- 110 - 129%
- 100 - 109%
- 90 - 99%
- 70 - 89%
- 50 - 69%
- < 50%
- Not Reported



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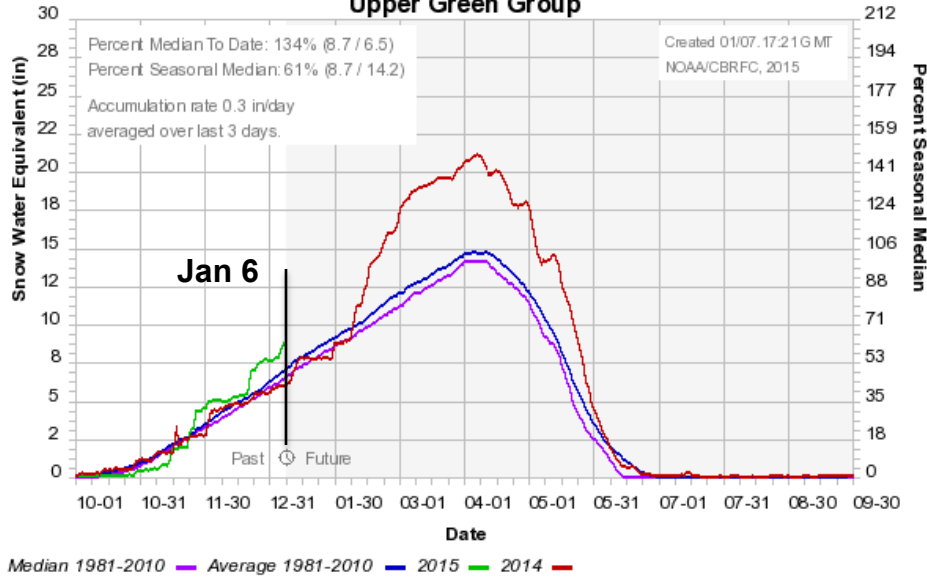


# January 6<sup>th</sup> Snow

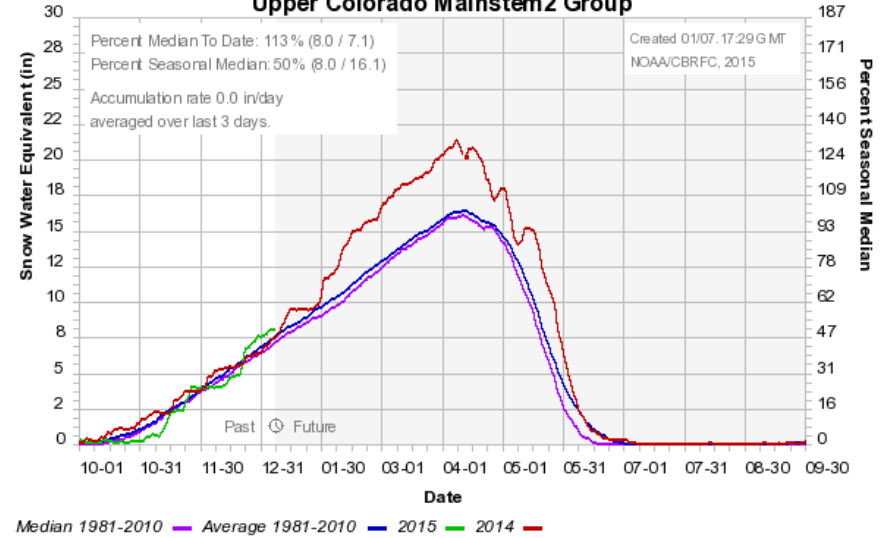


# Snow Groups

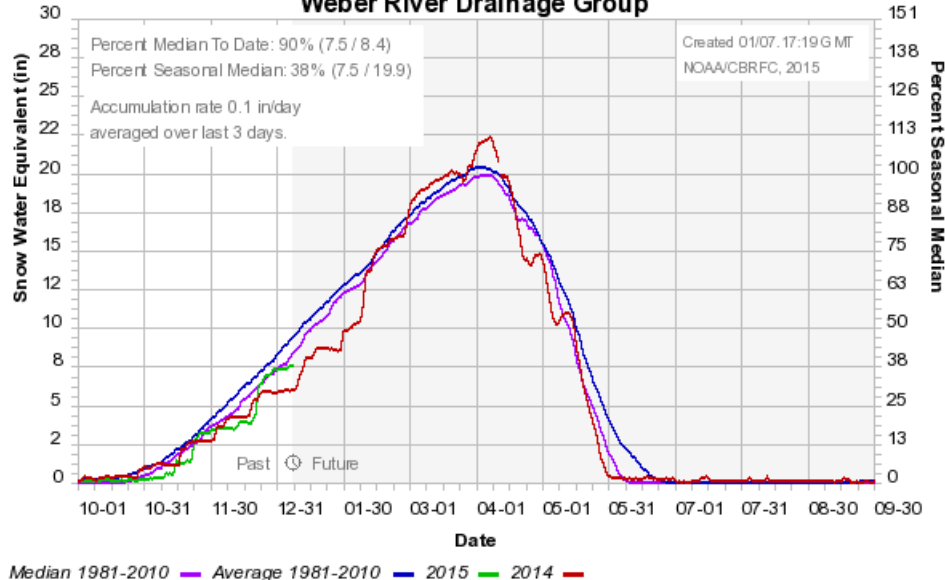
Colorado Basin River Forecast Center  
Upper Green Group



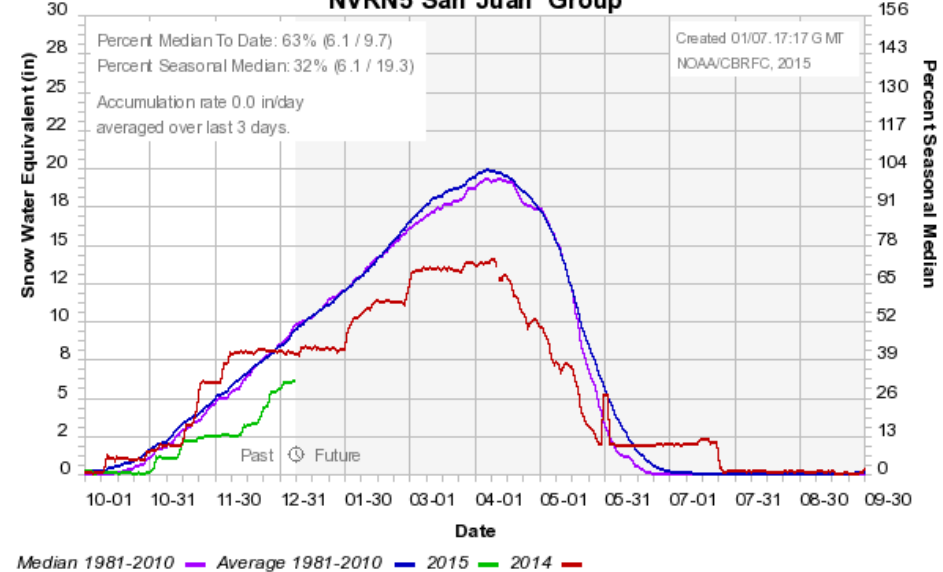
Colorado Basin River Forecast Center  
Upper Colorado Mainstem2 Group



Colorado Basin River Forecast Center  
Weber River Drainage Group

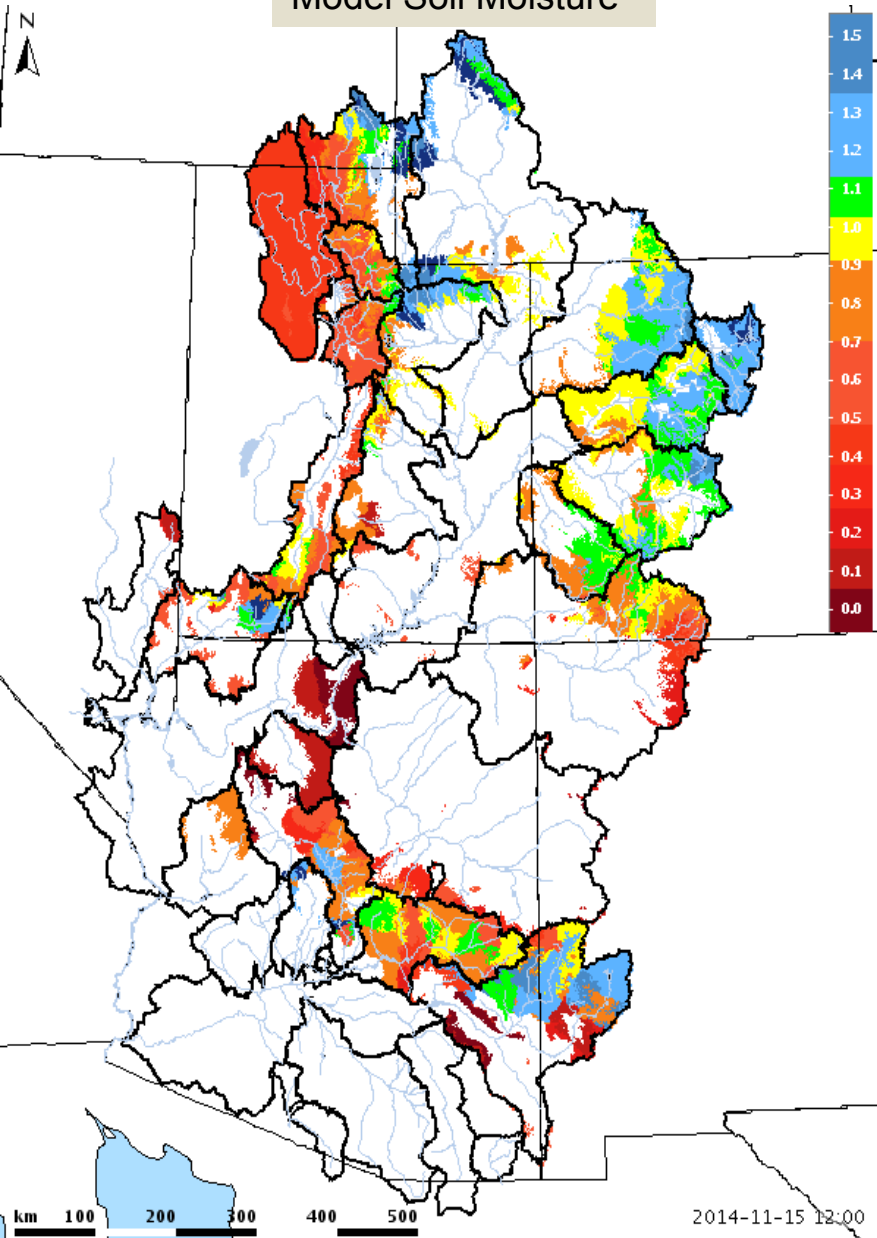


Colorado Basin River Forecast Center  
NVRN5 San Juan Group

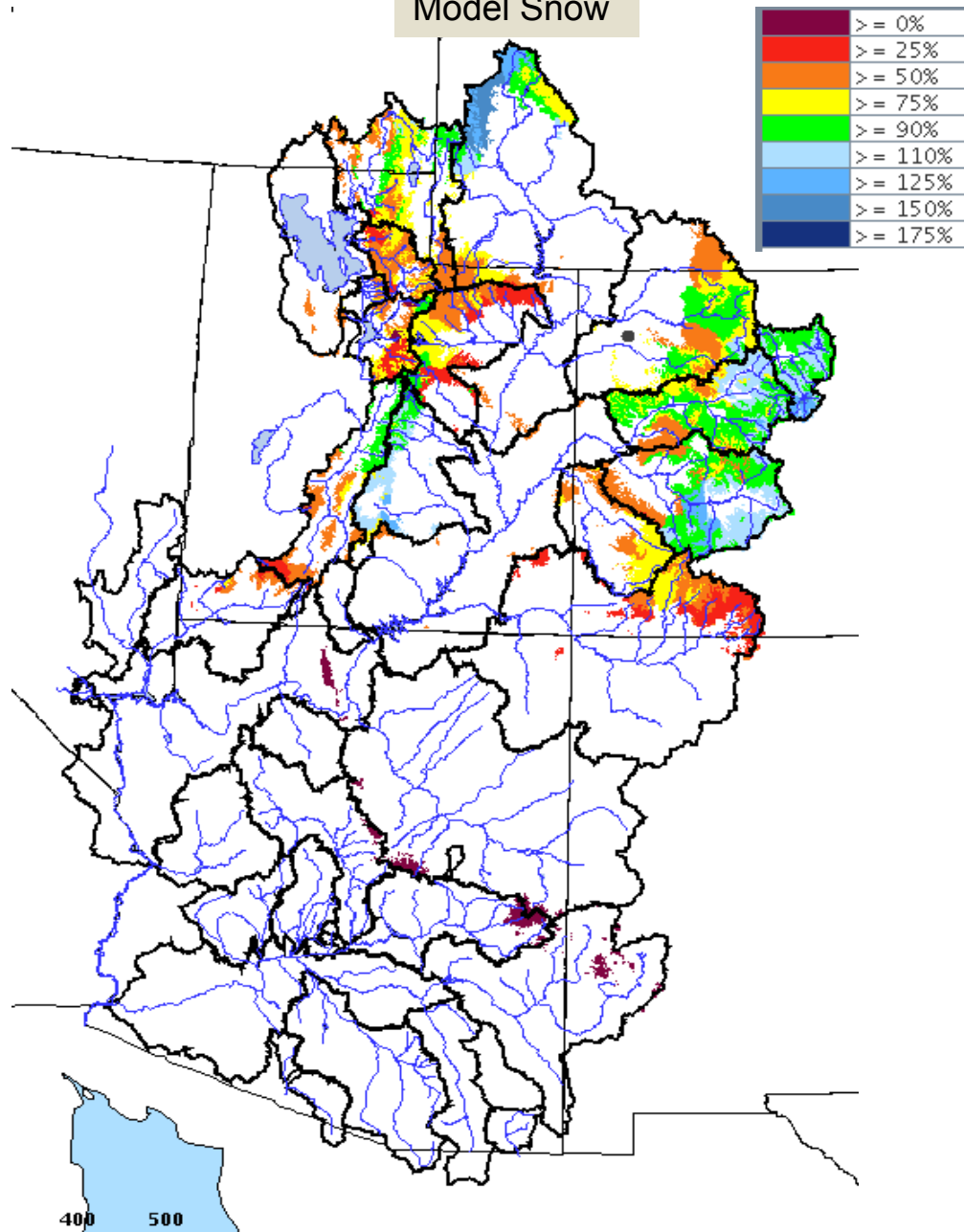


# Soil Moisture & Snow - Initial Conditions Driving the Forecasts

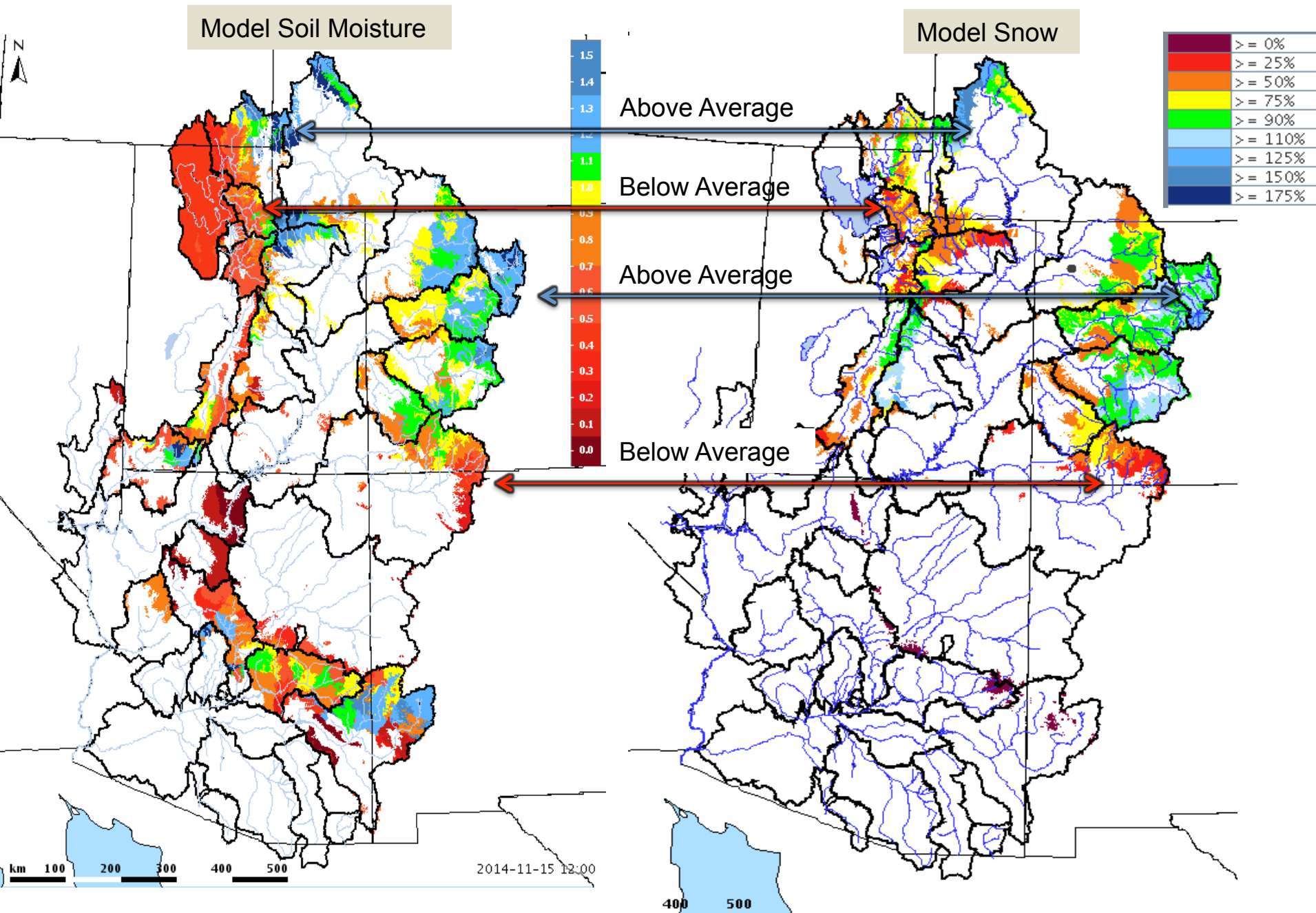
Model Soil Moisture



Model Snow

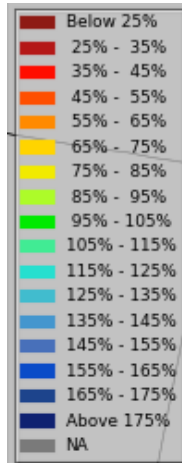


# Soil Moisture and Snow – Where are the signals the same ?



# January 1<sup>st</sup> Water Supply Forecasts

Apr-Jul Volumes / % Average – (50% exceedance forecasts)



**Flaming Gorge:**  
1000 KAF / 102%

**Yampa-Deerlodge:**  
1200 KAF / 97%

**Colorado-Cameo:**  
2500 KAF / 106%

**Blue Mesa:**  
690 KAF / 102%

**McPhee Res:**  
255 KAF / 86%

**Navajo Res:**  
450 KAF / 61%

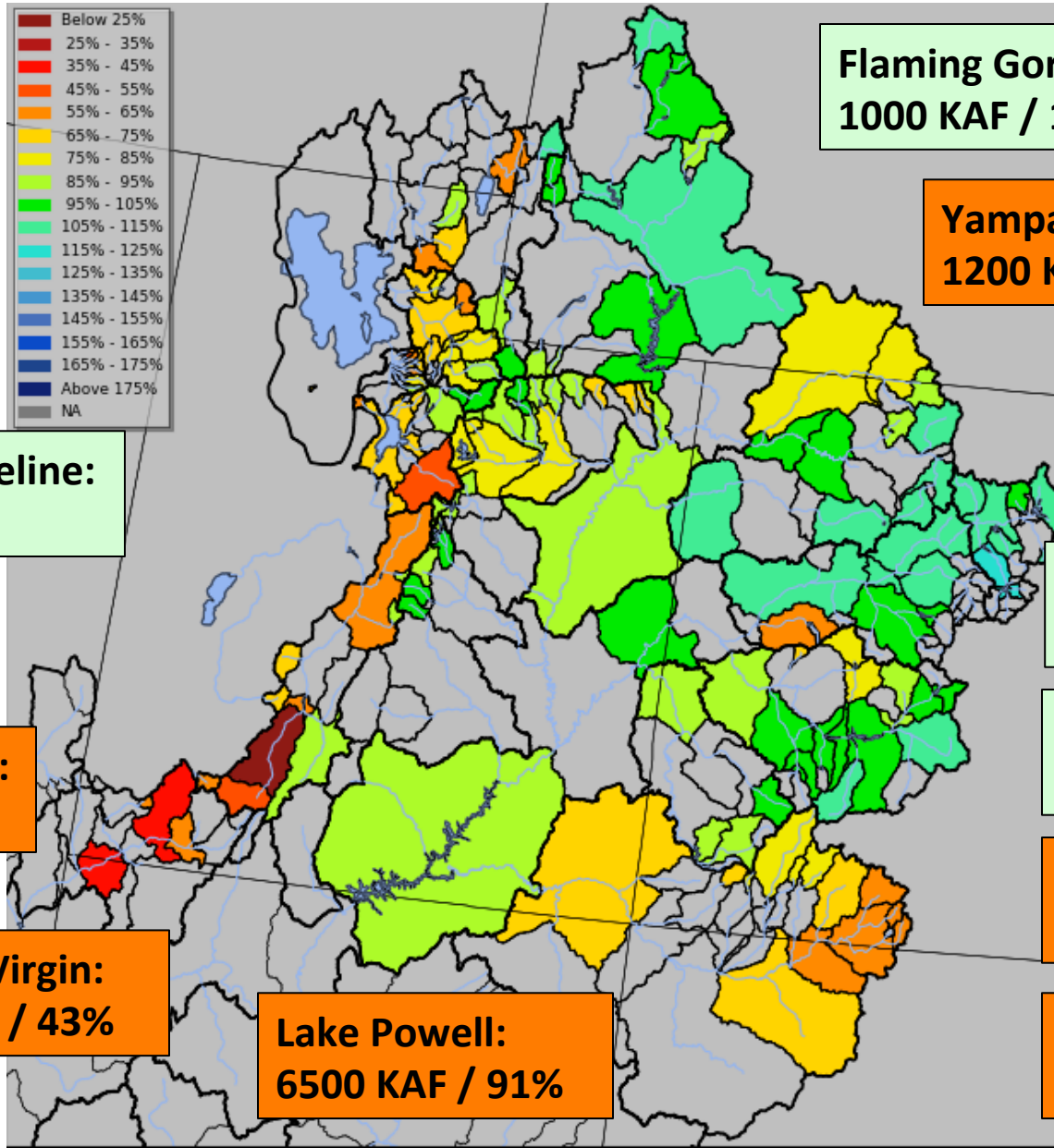
**Bear-UT/WY Stateline:**  
117 KAF / 105%

**Weber-Oakley:**  
107 KAF / 91%

**Provo-Woodland:**  
97 KAF / 97%

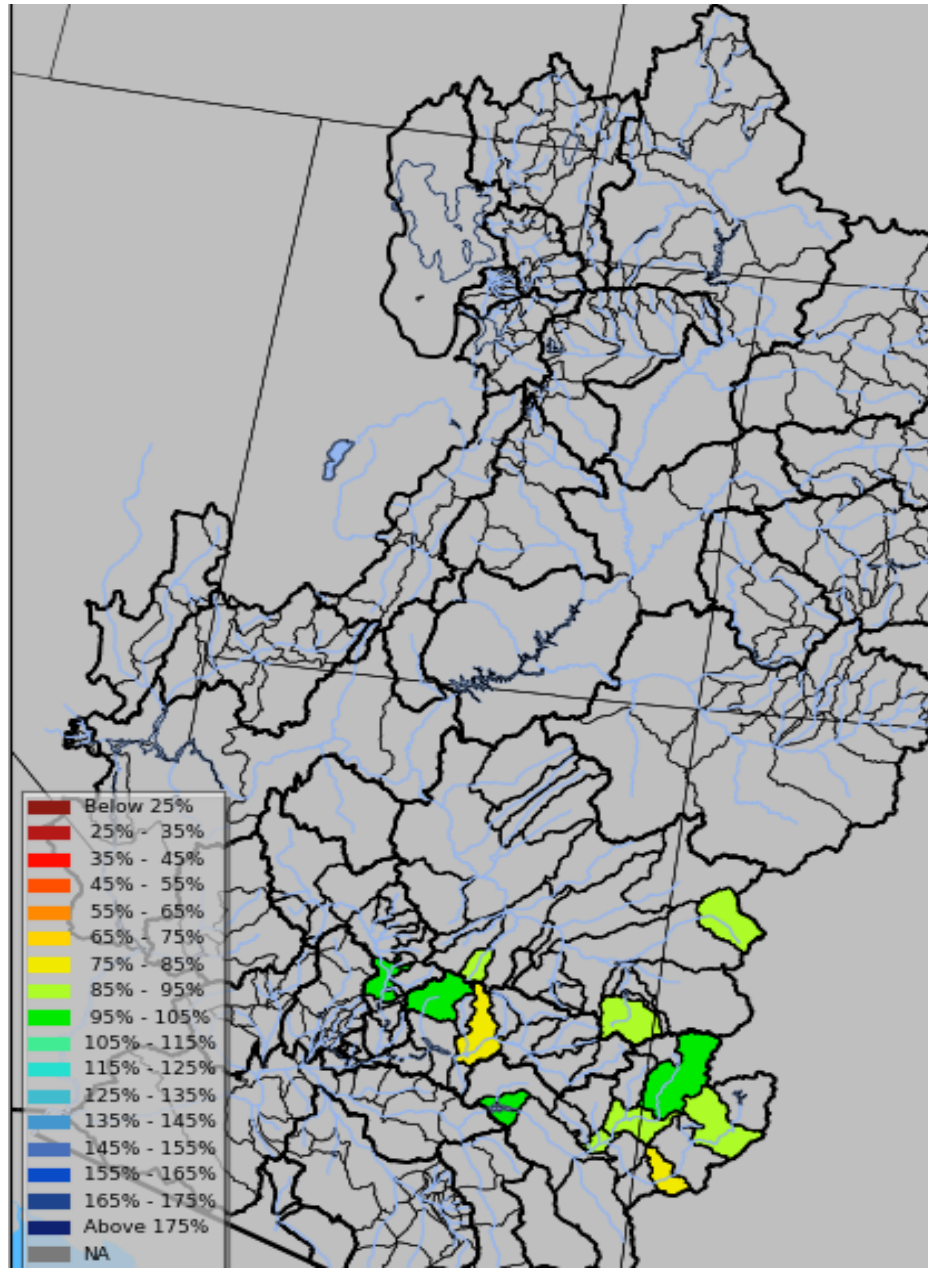
**Virgin-Virgin:**  
28 KAF / 43%

**Lake Powell:**  
6500 KAF / 91%



# January 1<sup>st</sup> Water Supply Forecasts

Jan-May Volumes / % Median



**Little Colorado-Lyman:**  
6.5 KAF / 92%

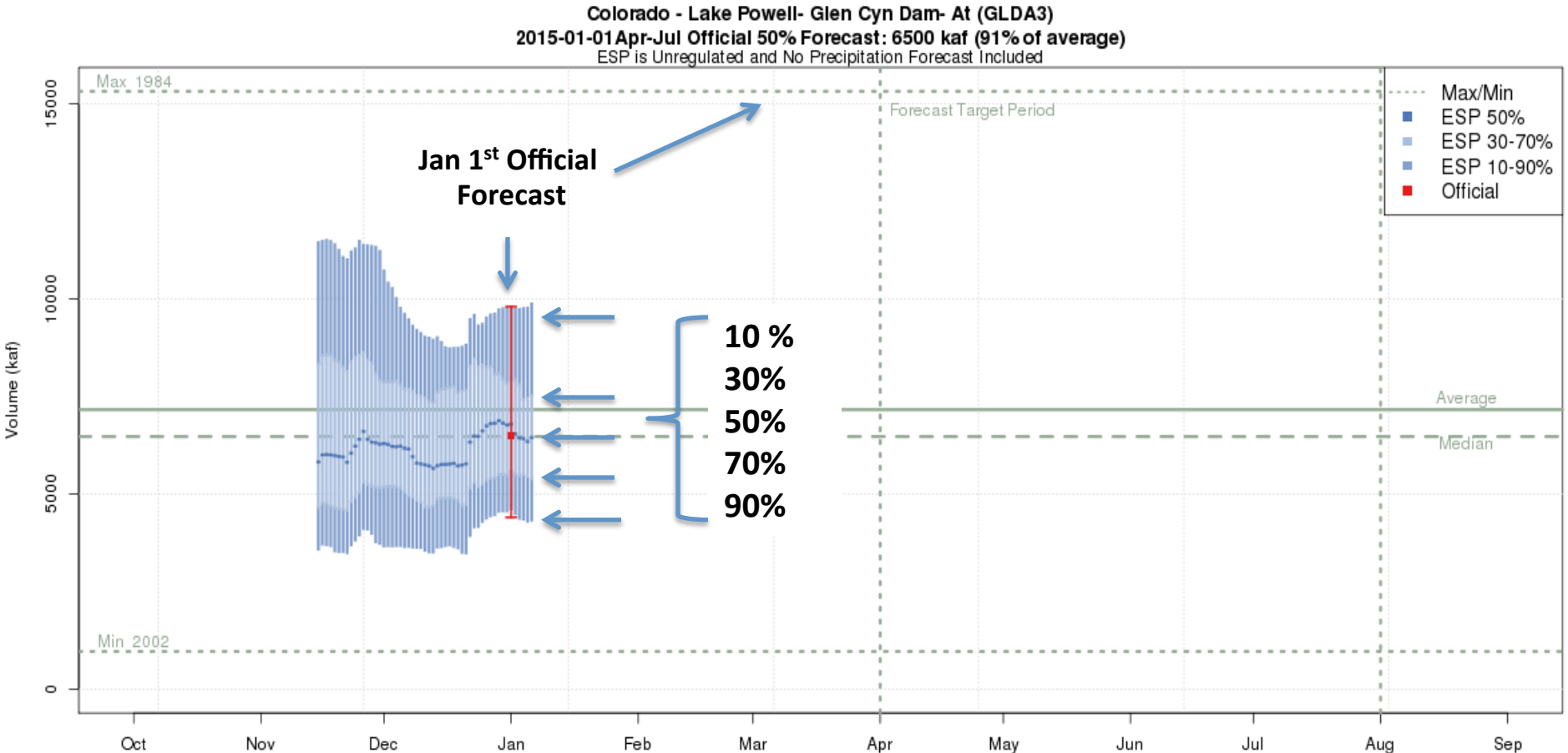
**Verde-Horseshoe:**  
150 KAF / 96%

**Salt - Roosevelt:**  
250 KAF / 81%

**Gila-Gila:**  
48 KAF / 86%

# Daily Ensemble Streamflow Prediction (ESP) Model Run & Official Forecast

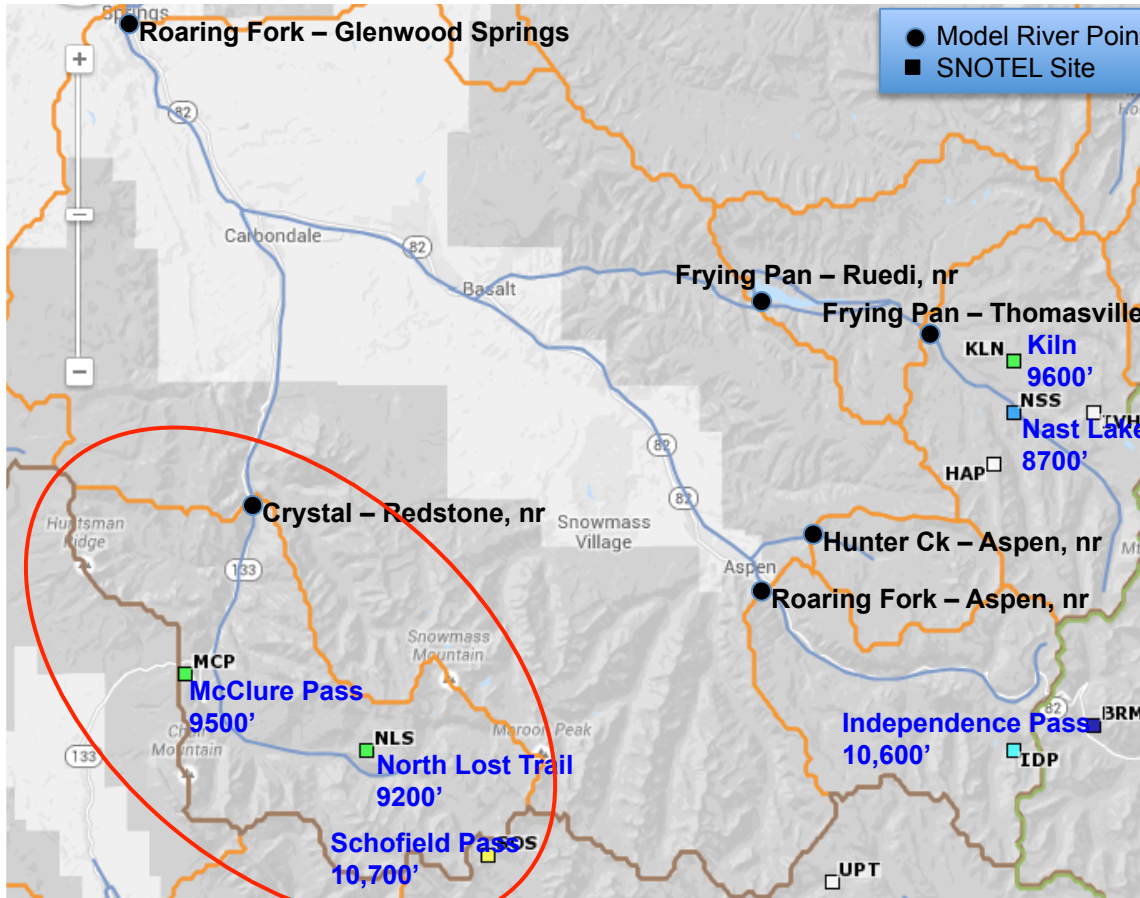
Available at: [www.cbrfc.noaa.gov](http://www.cbrfc.noaa.gov) Select: Water Supply Click: Point of Interest



The latest (2015-01-06) 50% ESP forecast is 6445 kaf.  
Plot Created 2015-01-06 16:12:28, NOAA / NWS / CBRFC

# SNOTEL Elevations vs. Flow Contribution

## Roaring Fork River Basin



### Crystal - Redstone

Modeled basin is broken into three elevation zones with stats as follows:

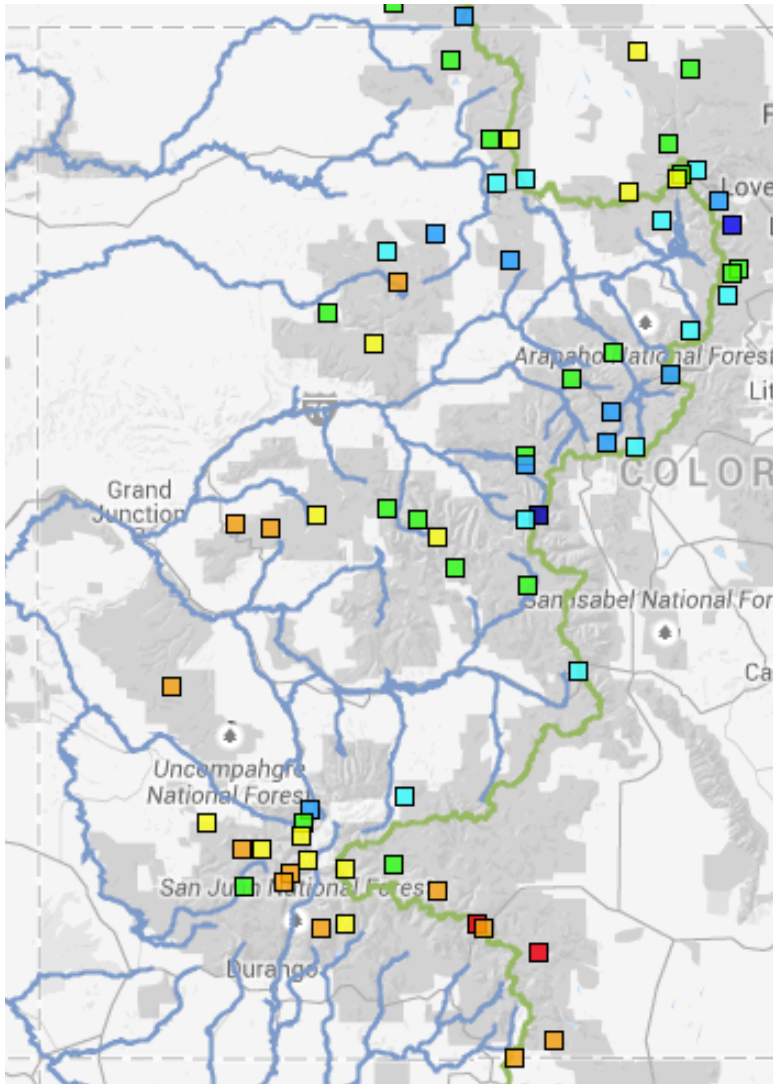
Elevation Band	% Total Area	% Flow Contribution
11,000' - 13,000'	33.5%	56%
9500' - 11,000'	33.5%	33%
7100' - 9500'	33%	11%

→ More than half of the flow comes from elevations above the highest SNOTEL station.



# SNOTEL Elevations vs. Flow Contribution

## Colorado River Basin SNOTEL Sites within the state of Colorado



### Colorado River Basin within Colorado

Modeled basin breakdown is as follows:

Elevation Band	% Total Area	% Flow Contribution (estimated)	% SNOTEL sites within band
>11,000'	16%	36%	16%
9500' – 11,000'	31%	41%	58%
<9500'	53%	23%	26%

→ There are no SNOTELS above 11,600', so the highest area is poorly represented.

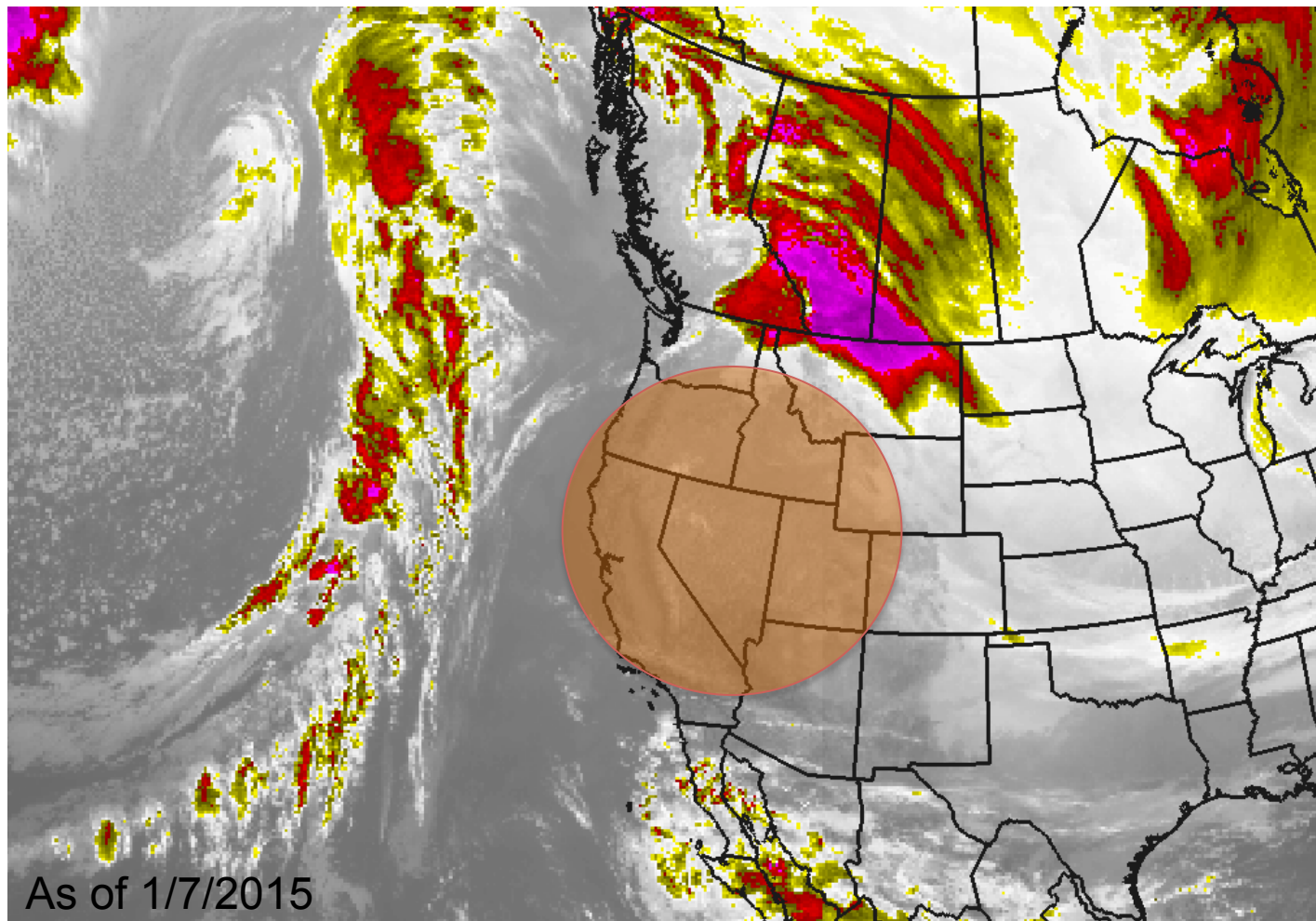
## Future Weather:

Strong ridge of high pressure over the area keeping conditions dry  
Weak quick hitting storm system possible early next week

Long Range Meteorological Model Ensembles: (Lower Confidence)

*Suggest a brief return to ridge conditions / dry later next week*

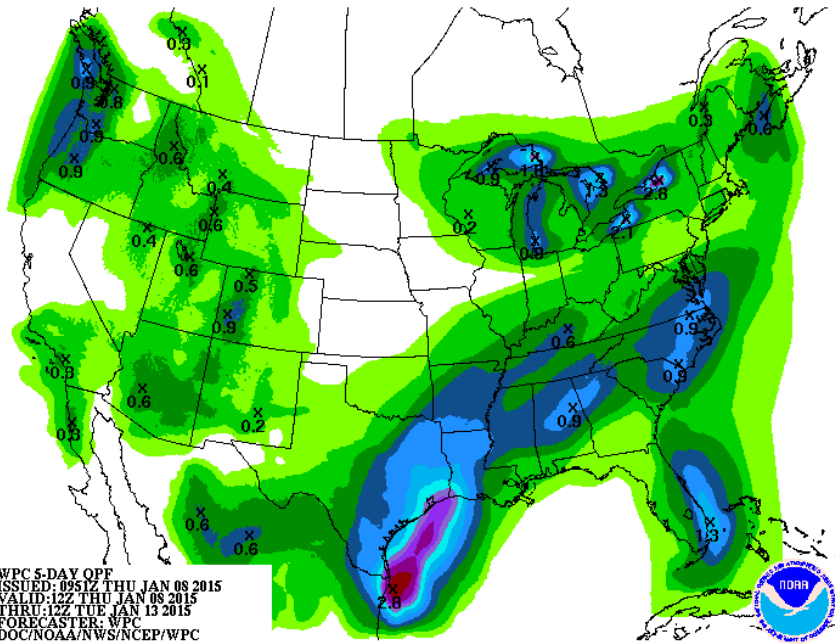
*Possibly more active weather by around the 20<sup>th</sup> of January*



As of 1/7/2015

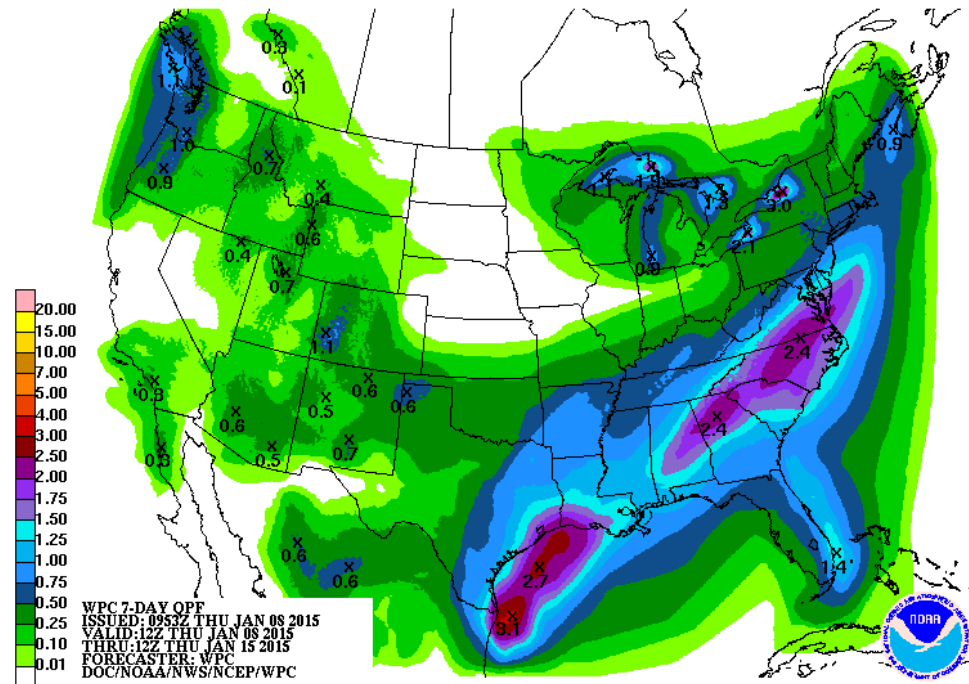
# Quantitative Precipitation Forecast

Weather Prediction Center



5 Day Total  
January 8-13

7 Day Total  
January 8-15



The prospect for El Niño: A 50-60% chance for next 2 months then neutral conditions thereafter.

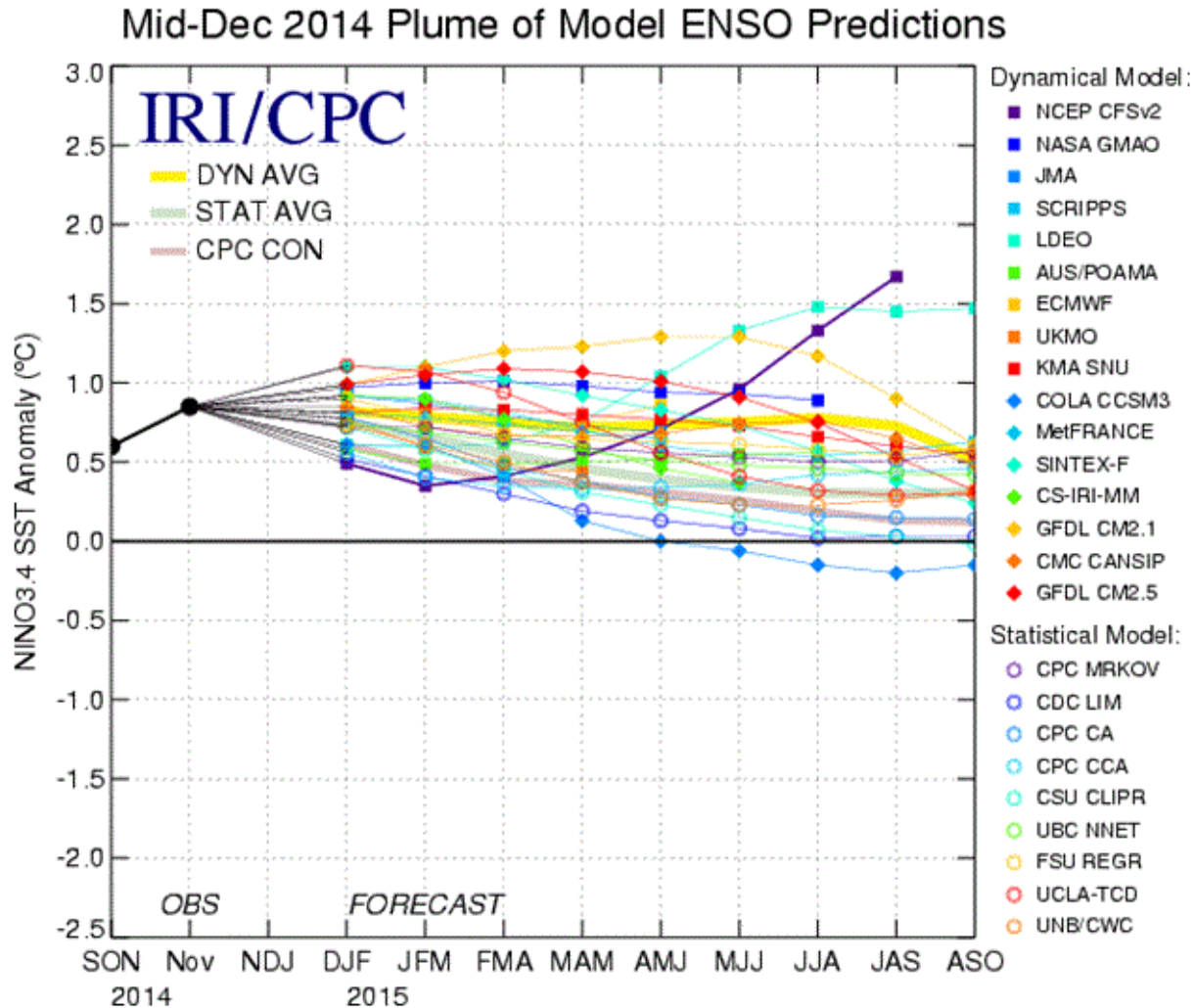


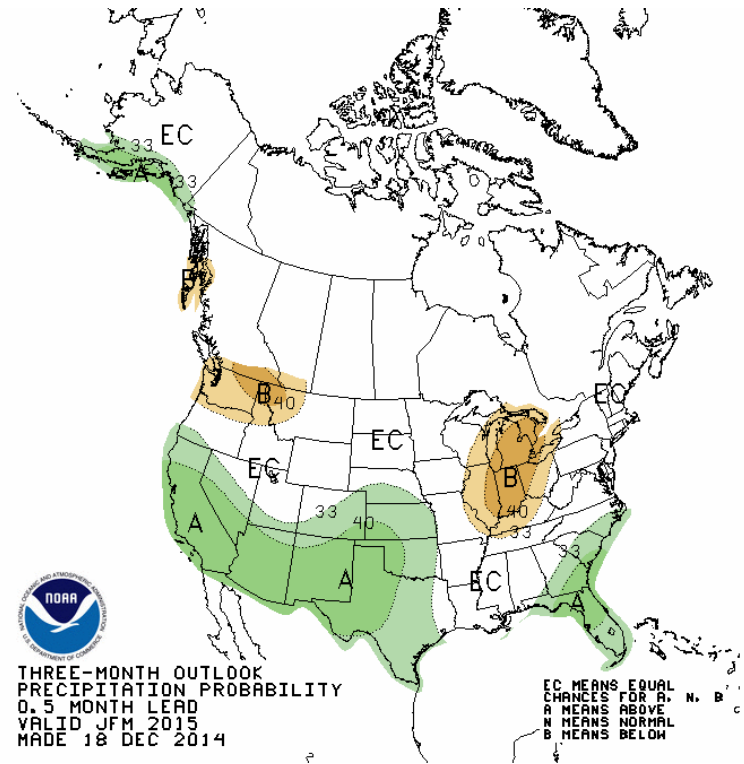
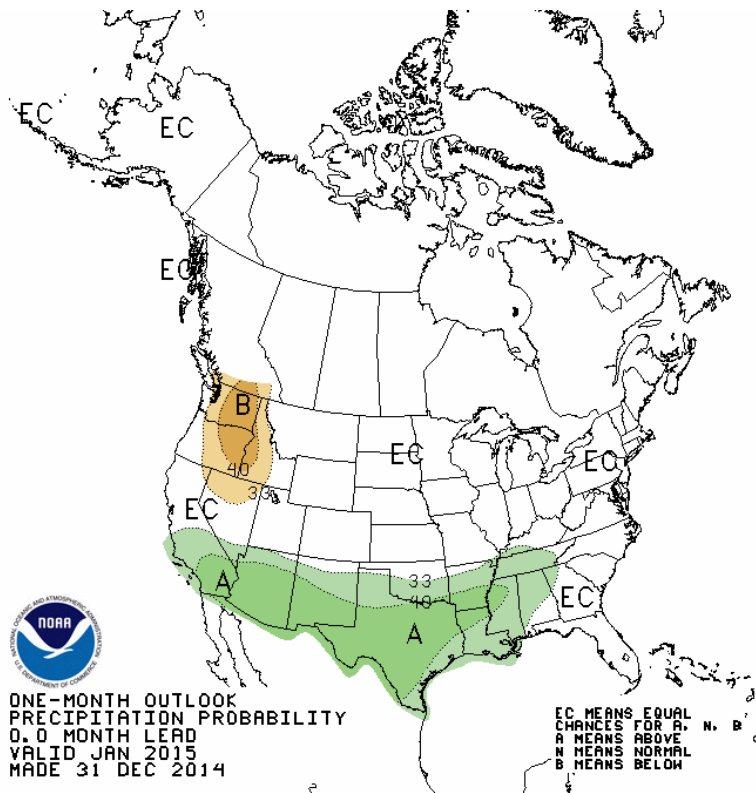
Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N-5°S, 120°W-170°W). Figure updated 16 December 2014.

# Long Term Precipitation Outlook

Climate Prediction Center

January 2015

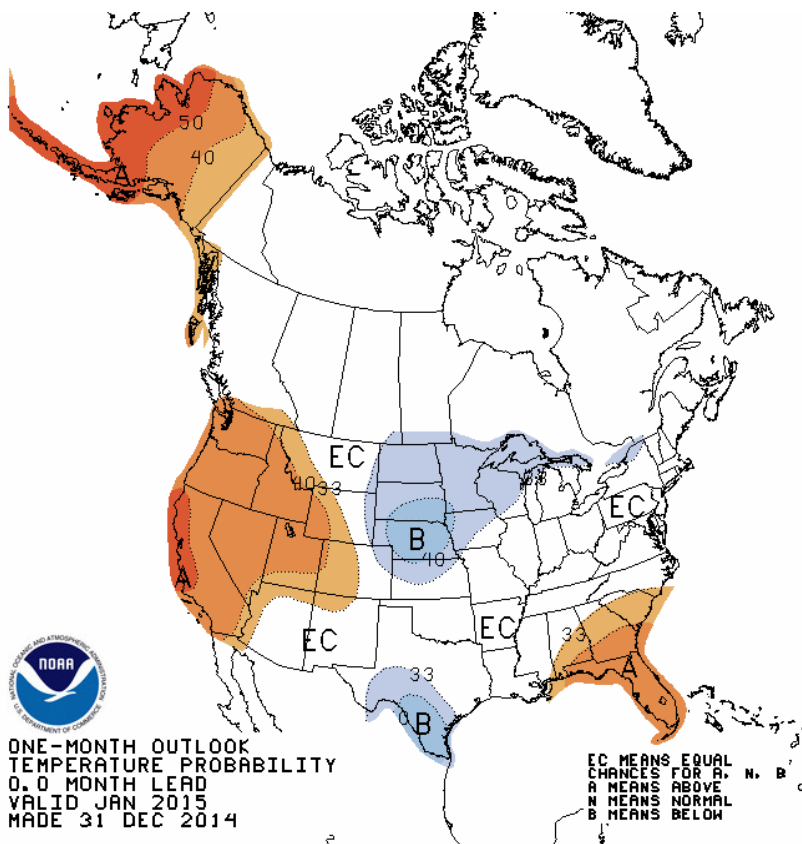
January-March 2015



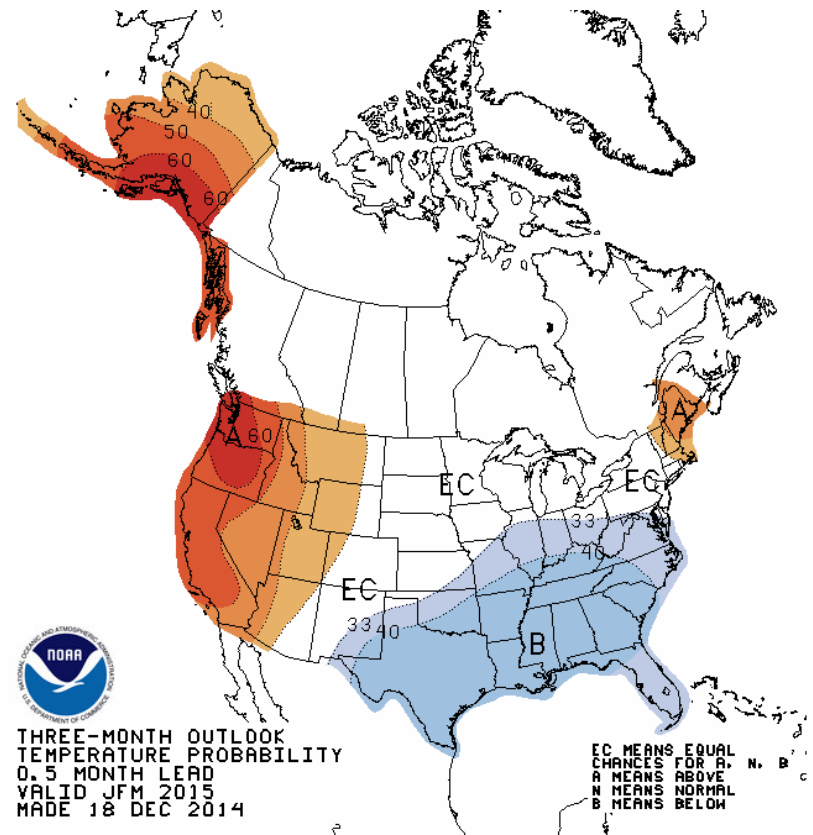
# Spring Temperature Outlook

Climate Prediction Center

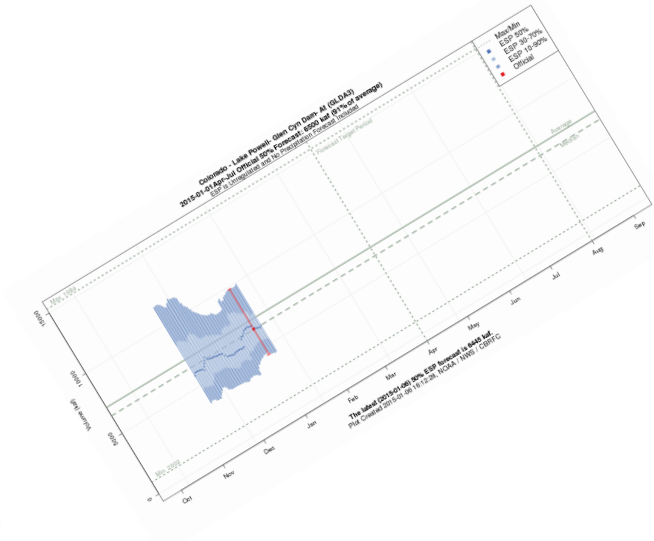
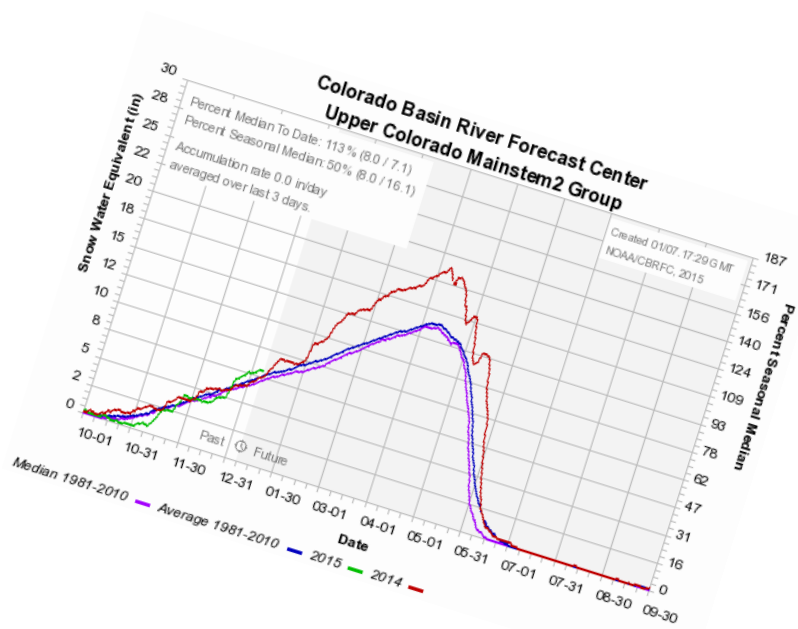
January 2015



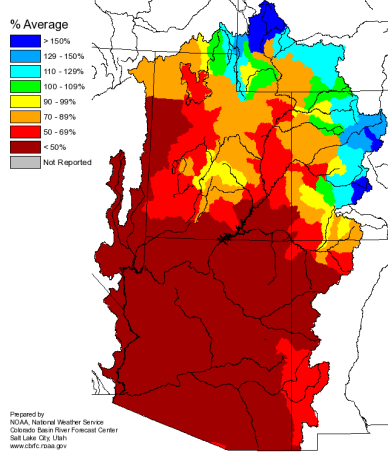
January-March 2015



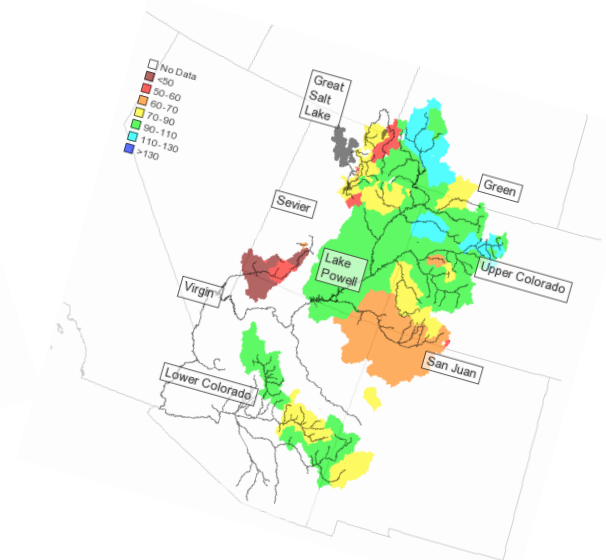
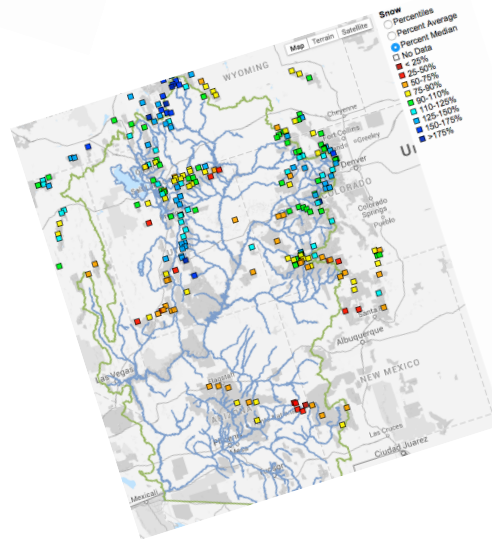
# A mass of information – Where to find it ?



Monthly Precipitation for November 2014  
(Averaged by Hydrologic Unit)



Prepared by  
NOAA, National Weather Service  
Colorado Basin River Forecast Center  
Salt Lake City, Utah  
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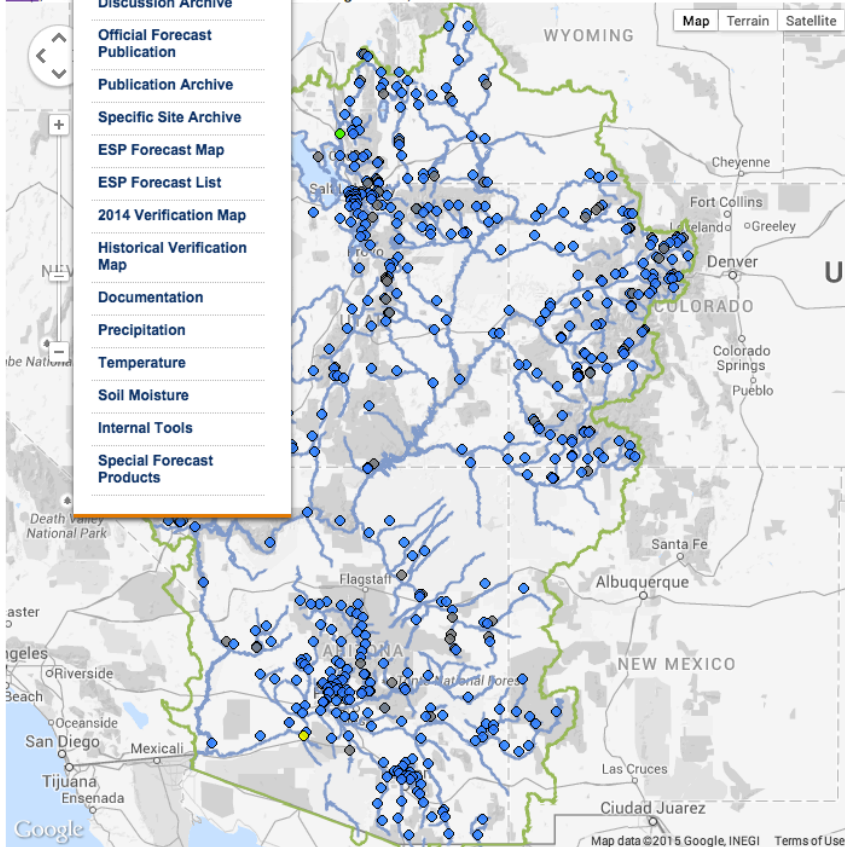
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09:55:01 -0700  
37.6 Lat: -110.5, Zoom: 6



- River**
- ◆ No Data
  - ◆ Normal
  - ◆ Significant Rise
  - ◆ Near Bankfull
  - ◆ Above Bankfull
  - ◆ Above Flood Stage
  - ◆ Outlook (> 3 days)

- Snow**
- Percentiles
  - Percent Average
  - Percent Median
  - No Data
  - < 25%
  - 25-50%
  - 50-75%
  - 75-90%
  - 90-110%
  - 110-125%
  - 125-150%
  - 150-175%
  - >175%

## River Conditions

Data Qu  
Help, Do

Search Points

Forecast Group  
All Points

### Overlays

- Rivers
- RFC Boundary
- Forecast Group
- Basin
- County
- County Warning Area
- Hydrologic Service Area

### River Points

- All
- Data
- Forecast
- Reservoir
- Official Flood
- Active

### Snow Sites

- All
- No Data
- No Average
- < 7000 ft
- 7000-8000 ft
- 8000-9000 ft
- 9000-10000 ft
- > 10000 ft

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Observed Precipitation  
Observed Temperature  
Observed Freezing Level  
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Radar  
Radar Bias  
Satellite

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## Water Supply Forecasts Official Forecast Date: 2015-1-1

[Help](#), [Double Click Map to Zoom](#), Lat: 37.6 Lng: -110.5, Zoom: 6

  
Search Points

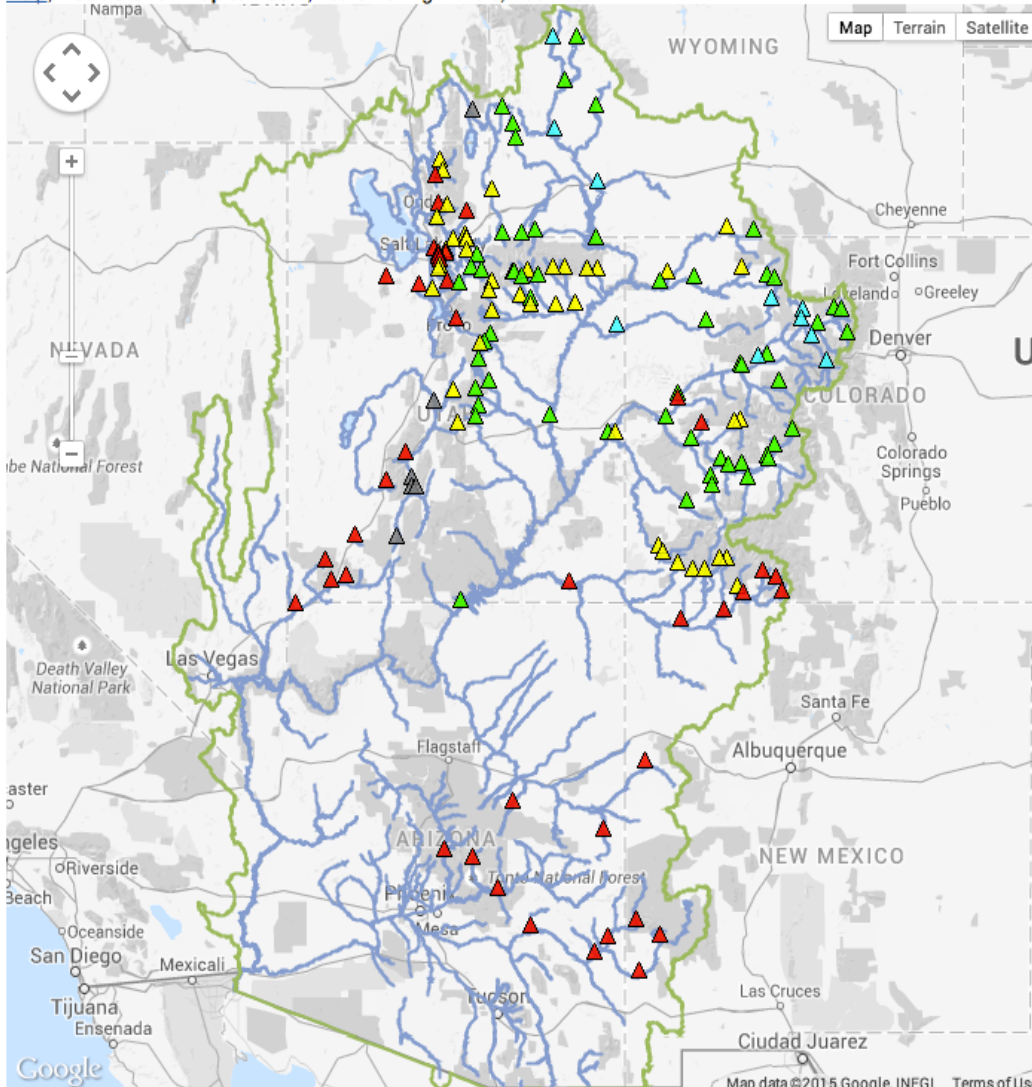
### Forecast Group

### Overlays

- Rivers
- RFC Boundary
- Forecast Group
- Basin
- County
- County Warning Area
- Hydrologic Service Area

### Snow Sites

- All
- No Data
- No Average
- < 7000 ft
- 7000-8000 ft
- 8000-9000 ft
- 9000-10000 ft
- > 10000 ft



### Water Supply Forecasts

- Official Percent Average
- Official Percent Median
- ESP Percent Average
- ESP Percent Median
- ▲ < 70%
- ▲ 70-90%
- ▲ 90-110%
- ▲ 110-130%
- ▲ >130%
- ▲ Regulated
- △ No Forecast

### Snow

- Percentiles
- Percent Average
- Percent Median
- No Data
- < 25%
- 25-50%
- 50-75%
- 75-90%
- 90-110%
- 110-125%
- 125-150%
- 150-175%
- >175%



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Search Points

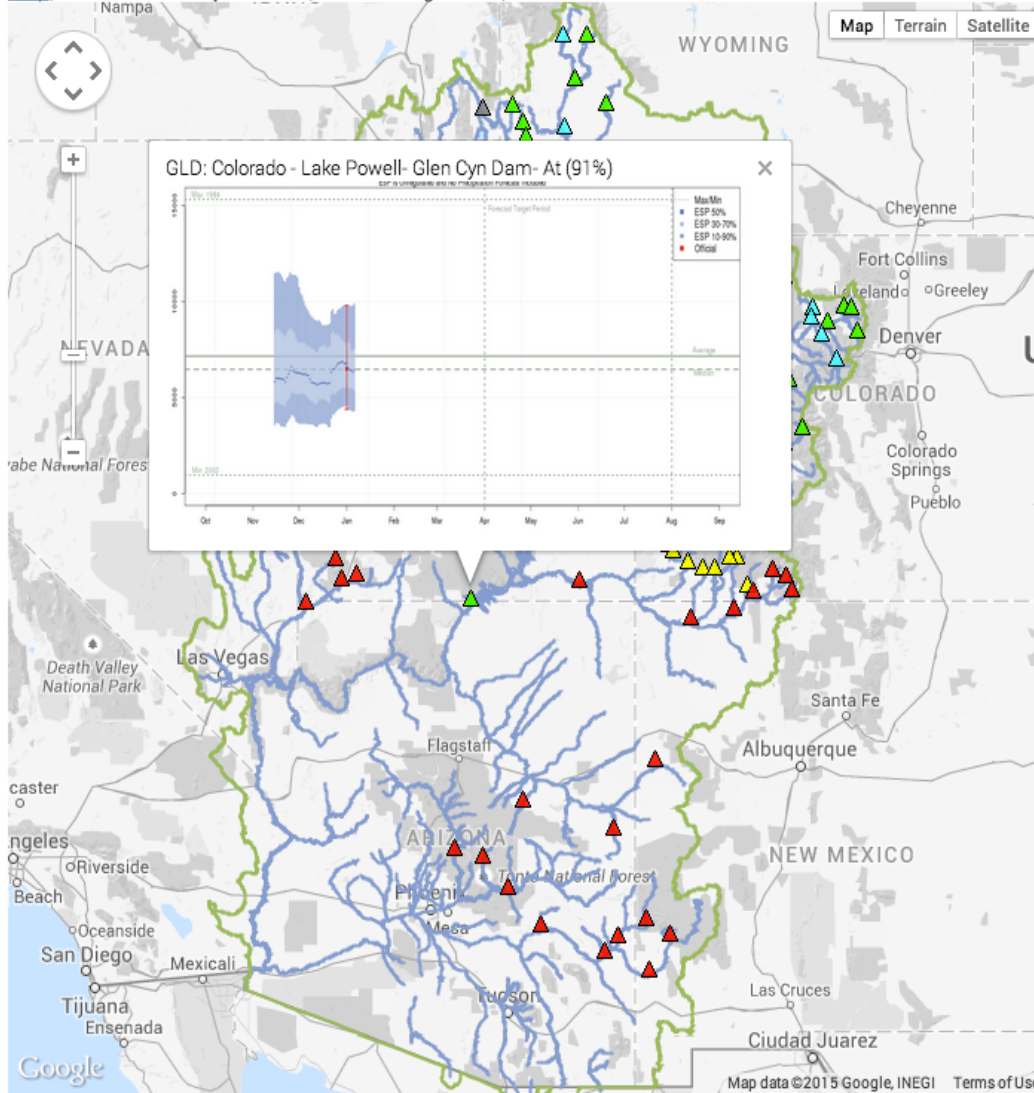
### Forecast Group

### Overlays

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### Snow Sites

- All
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- No Average
- < 7000 ft
- 7000-8000 ft
- 8000-9000 ft
- 9000-10000 ft
- > 10000 ft



### Water Supply Forecasts

- Official Percent Average
- Official Percent Median
- ESP Percent Average
- ESP Percent Median
- < 70%
- 70-90%
- 90-110%
- 110-130%
- >130%
- Regulated
- No Forecast

### Snow

- Percentiles
- Percent Average
- Percent Median
- No Data
- < 25%
- 25-50%
- 50-75%
- 75-90%
- 90-110%
- 110-125%
- 125-150%
- 150-175%
- >175%



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### Water Supply Volume Percent Average/Median Condition

▲ <70 ▲ 70-90 ▲ 90-110 ▲ 110-130 ▲ >130 ▲ Regulated

Options (on/off): Plot

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

Columns (on/off): [Area](#) [Sub Area](#) [NWS ID](#) [DS](#) [River](#) [Location](#) [Forecast Date](#) [Avg Cond](#) [Med Cond](#) [Forecast Period](#) [Min 90](#) [MP 50](#) [Max 10](#) [Avg](#) [Med](#) [Pct Avg](#) [Pct Med](#)

Click column heading to sort by that data. Click ID to view point info. Click Area, Sub Area, or Forecast Period to show only those points.

	<a href="#">Area</a>	<a href="#">Sub Area</a>	<a href="#">NWS ID</a>	<a href="#">River</a>	<a href="#">Location</a>	<a href="#">Forecast Date</a>	<a href="#">Avg Cond</a>	<a href="#">Med Cond</a>	<a href="#">Forecast Period</a>	<a href="#">Min 90</a>	<a href="#">MP 50</a>	<a href="#">Max 10</a>	<a href="#">Avg</a>	<a href="#">Med</a>	<a href="#">Pct Avg</a>	<a href="#">Pct Med</a>
1	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">WBRW4</a>	Green	Daniel	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	176	275	375	245	220	112	125
2	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">FRAW4</a>	Pine Ck	Fremont Lk	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	70	100	130	98	94	102	106
3	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">BPNW4</a>	New Fork	Big Piney	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	230	345	535	355	315	97	110
4	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">GBRW4</a>	Green	Fontenelle Res	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	475	800	1220	725	650	110	123
5	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">BSRW4</a>	Big Sandy	Farson	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	29	48	72	52	47	92	102
6	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">GRRW4</a>	Green	Green River	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	475	805	1270	730	630	110	128
7	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">SLRW4</a>	Ef Smiths Fork	Stateline Res	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	15	24	32	26	23	92	104
8	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">BNRU1</a>	Blacks Fork	Robertson	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	50	82	115	89	93	92	88
9	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">HMFV4</a>	Hams Fork	Frontier	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	30	55	86	54	47	102	117
10	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">VIVW4</a>	Hams Fork	Viva Naughton Res	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	44	76	125	74	63	103	121
11	<a href="#">Green</a>	<a href="#">Upper</a>	<a href="#">GRNU1</a>	Green	Flaming Gorge Res	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	600	1000	1690	980	830	102	120
12	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">YASC2</a>	Yampa	Stagecoach Rsvr	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	16	26	36	23	21	113	124
13	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">STMC2</a>	Yampa	Steamboat Springs	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	180	280	370	260	250	108	112
14	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">ENMC2</a>	Elk	Milner	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	225	350	430	320	325	109	108
15	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">ELHC2</a>	Elkhead Ck	Long Gulch	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	32	65	88	73	76	89	86
16	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">MBLC2</a>	Yampa	Maybell	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	545	950	1200	935	895	102	106
17	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">LSRC2</a>	Little Snake	Slater	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	82	145	196	156	154	93	94
18	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">LSDW4</a>	Little Snake	Dixon	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	144	275	435	345	360	80	76
19	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">LLC2</a>	Little Snake	Lily	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	140	285	480	345	300	83	95
20	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">YDLC2</a>	Yampa	Deerlodge Park	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	665	1200	1600	1240	1170	97	103
21	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">WRMC2</a>	White	Meeker	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	200	295	355	280	265	105	111
22	<a href="#">Green</a>	<a href="#">Yampa/White</a>	<a href="#">WATU1</a>	White	Watson	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	215	310	380	280	285	111	109
23	<a href="#">Green</a>	<a href="#">Duchesne</a>	<a href="#">BRUU1</a>	Big Brush Ck	Vernal	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	10.7	15	24	21	19.9	71	75
24	<a href="#">Green</a>	<a href="#">Duchesne</a>	<a href="#">ASHU1</a>	Ashley Ck	Vernal	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	20	36	62	50	44	72	82
25	<a href="#">Green</a>	<a href="#">Duchesne</a>	<a href="#">WTRU1</a>	Whiterocks	Whiterocks	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	25	39	65	54	47	72	83
26	<a href="#">Green</a>	<a href="#">Duchesne</a>	<a href="#">NEUU1</a>	Uinta	Neola	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	40	65	97	74	62	88	105
27	<a href="#">Green</a>	<a href="#">Duchesne</a>	<a href="#">YLLU1</a>	Yellowstone	Altonah	2015-1-1	▲	▲	<a href="#">Apr 01-Jul 31</a>	38	57	75	61	58	93	98



## News

- Wa
- CB Conditions Map
- CB Conditions List
- Snow Groups**

## Snow Groups



Raw SNOTEL data from NRCS.

### Great Basin

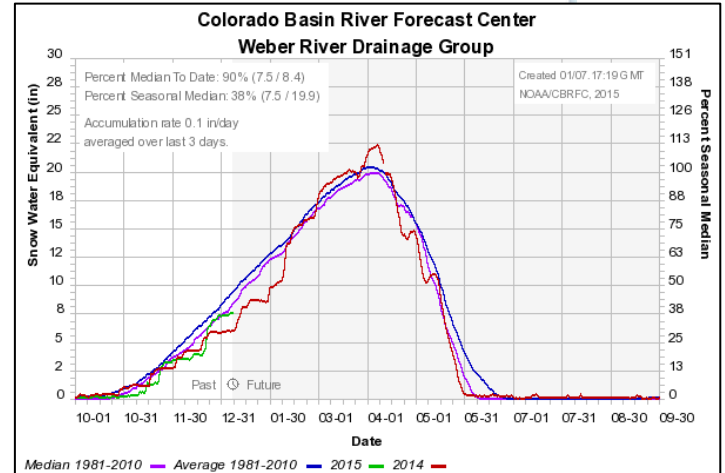
- Bear River Drainage (bulu1 fbn1 hfku1 klw4 llku1 lbnu1 lbtu1 mcru1 tglu1 oxsi1 sepi1 dpbu1)
- Bear River Headwaters (hfku1 llku1 chcu1)
- Bear River below Woodruff (dbpu1 mcru1 bulu1 klw4 givi1 fbn1)
- Beaver Minersville (bgfu1 mvyu1)
- Clear Creek Sevier (kmnu1)
- Cottonwood Canyons (mldu1 briu1 sbdu1)
- Logan BlacksFork Little Bear Basins (bulu1 tglu1 fbn1)
- Ogden River Drainage (blpu1 bltu1 dbpu1 hrgu1 lbtu1 mcru1)
- Provo River Basin (trlu1 dstu1 nwyu1 stdu1 timu1)
- Sevier River Basin Blo Piute (mcd u1 rpru1 seeu1 bvdu1 pklu1)
- Sevier River Basin Headwaters (wflu1 mdvu1 cvyu1 lvju1 hrsu1 wstu1 bgfu1)
- Sevier River Drainage (mdvu1 bxcu1 frlu1 pklu1 cvyu1 wstu1 kmnu1 pcku1 mcd u1 bvdu1 hrsu1 lvju1)
- Six Creeks Headwaters (lopu1 psuu1 mldu1 briu1 sbdu1 thcu1 timu1 rbsu1)
- Smith Fork Bear Basin (clw4 stw4 klw4 incw4)
- Spanish Fork Drainage (clcu1 crku1 pysu1 wrvu1 stdu1)
- Utah Lake Drainage (clcu1 crku1 cucu1 dstu1 nwyu1 pysu1 rbsu1 timu1 trlu1 wrvu1)
- Weber Basin Headwaters (smmu1 trlu1 ccku1 chcu1)
- Weber River Drainage (blpu1 bltu1 ccku1 chcu1 dbpu1 hrgu1 fmmu1 mcru1 trlu1 thcu1 nwyu1 smmu1 psuu1 haru1)

### Lower Colorado

- Central Mogollon Rim (proa3 bkba3)
- Gila River (cnda3 frdn5 scdn5 lkt5 sgn5 hnma3)
- LC Southern Headwaters (bbsa3 blda3 hbea3 mvfa3)
- Little Colorado River (bkba3 blda3 mvfa3 mbea3 proa3)
- Lower Colorado (whla3 frya3 mma3 bkba3 proa3 wkma3 blda3 mvfa3 wcta3 hnma3 cnda3 sgn5 lkt5)
- Salt (mvfa3 cnda3 wcta3 xbha3)
- Salt River (blda3 cnda3 hnma3 mvfa3 wcta3)
- San Francisco (frdn5 cnda3 xbha3)
- Upper Gila (scdn5 lkt5 sgn5)
- Upper Salt (mvfa3 cnda3 wcta3 xbha3)
- Verde (whla3 bkba3 frya3 mma3)
- Verde River (bkba3 frya3 mma3 whla3)
- virgin (cvyu1 hrsu1 lgu1 lgu1 mdvu1)

### Green River

- Duchesne River (icyu1 wrvu1 stdu1 dstu1 cucu1 trlu1 rku1 lbnu1 bndu1 lkfu1 fplu1 cw hu1 mmtu1)
- Flaming Gorge-North Slope (hewu1 hir u1 hpsu1 scku1)
- Green River Basin (kndw4 hmkw4 erdw4 sniw4 klw4 lopw4 nflw4 trpw4 grvw4 scdw4 bgsw4 kgcu1 hpsu1 hir u1 ekpw4 incw4 tcku1 hewu1 scku1 rku1 cucu1 dstu1 stdu1 wrvu1 kgcu1 icyu1 mmtu1 trlu1 lkfu1 cw hu1 bndu1 fplu1 lbnu1 btlw4 blsc2 burc2 colc2 crsc2 dwdw4 drlc2 elkc2 lync2 oldw4 resc2 rrcp2 rrs w4 towc2 tisc2 wpkw4 seeu1 bufu1 rpru1 clcu1 mcd u1 wrvu1)
- Green abv Fontenelle (sniw4 scdw4 trpw4 bbsw4 erdw4 lopw4 grvw4 kndw4 nflw4 ekpw4)
- Ham's Fork (klw4 hmkw4 incw4)
- Little Snake (btlw4 dwdw4 oldw4 rsw4 wpkw4)
- Price-San Rafael (bufu1 mcd u1 rpru1 seeu1 wrvu1 clcu1 dc pu1)
- Upper Green (sniw4 scdw4 trpw4 bbsw4 erdw4 lopw4 grvw4 kndw4 nflw4 ekpw4 bgsw4 incw4 klw4 hmkw4 hewu1 hir u1 scku1 hpsu1)
- White (blsc2 burc2 rrcp2 tisc2)
- Wind Rivers (bgsw4 ekpw4 kndw4 nflw4)
- Yampa-White (dwdw4 oldw4 rsw4 btlw4 wpkw4 elkc2 towc2 drlc2 resc2 crsc2 blsc2 burc2 rrcp2 tisc2)



# 2015 Forecast Webinar Schedule

February 5 at 1 pm MT

March 5 at 11 a1 pm MT

April 7 at 11am MT

May 7 at 11am MDT

Registration available:

[www.cbrfc.noaa.gov/news/wswebinar2015.html](http://www.cbrfc.noaa.gov/news/wswebinar2015.html)

Feedback Is Appreciated

# Please contact us with any specific questions

- Key Water Supply Contacts:
  - Michelle Stokes (Hydrologist in Charge)
  - Brenda Alcorn (Upper Colorado)
  - Ashley Nielson (Green + Yampa / White)
  - Greg Smith (San Juan + Gunnison + Dolores)
  - Paul Miller (Great Basin – Bear, Weber, Provo, Six-Creeks/Jordan)
  - Tracy Cox (Lower Colorado + Virgin + Sevier)