

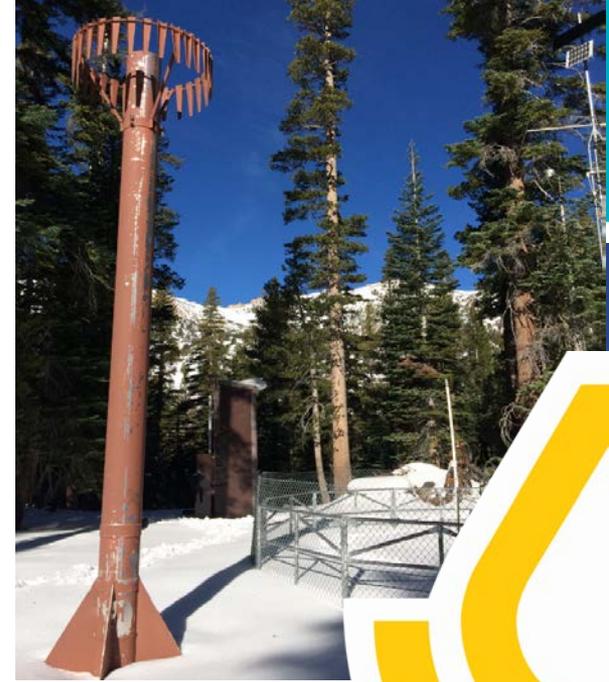


United States Department of Agriculture



# 2017 Snowpack Status and Streamflow Outlook for the Carson Basin

March 8, 2017  
Carson River Watershed  
Regional Flood Management Workshop




Natural Resources Conservation Service  
www.nv.nrcs.usda.gov/snow

*Buried Chairlift at Kirkwood Ski Resort, Jan 2017*

Jeff Anderson  
Nevada NRCSSnow Survey

(775) 857-8500 x152  
jeff.anderson@nv.usda.gov

# Theme: Bigger than 2011 & perhaps 1983

## Key Points:

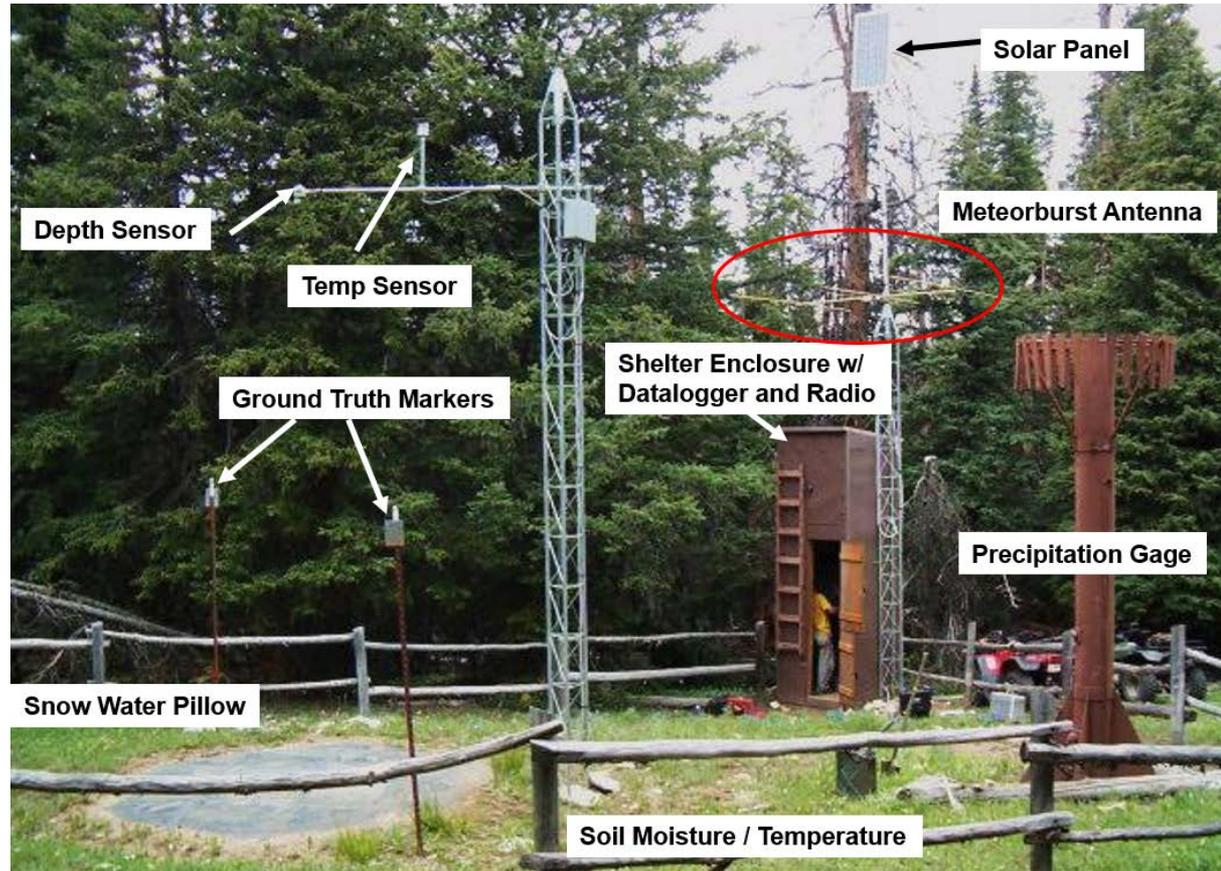
1. 2017 = Historic Snow & Precip
2. Soil moisture is already similar to past snowmelt periods
3. Potential for large (record?) runoff volumes

03/02/2017



## Vocabulary:

**Snow Water Equivalent (SWE)**  
**Snow Course**  
**SNOTEL**





You are Here: [Home](#) / [Snow Survey](#)



## Snow Survey

- [Snow Survey Products](#)
- [Water Supply Products](#)

 **Subscribe**  
to the monthly  
snow and water  
outlook report

[Join our email list](#)

## Snow Survey

### Nevada NRCS Snow Survey Program

The [NRCS Snow Survey Program](#) provides mountain snowpack data and streamflow forecasts for the western United States. Applications of snow survey products include water supply management, flood control, climate modeling, recreation, and conservation planning.

### Latest Snow & Water Supply Information:

[March 1, 2017 Water Supply Outlook Report - NEW](#)

[Snowpack Graphs - 2017 vs other big years - NEW](#)

[Interactive Map 3.0 \(beta\)](#) options include delta function, snow density, water year peak, streamflow forecasts, basin reporting. - **NEW**

[News Release: Hole-in-Mtn SNOTEL Rebuilt - updated](#)

### Today's Snow & Precipitation Update Reports

- > [Why are there missing precip data in update reports?](#)
- > [Snow and Precipitation - Percent of Normal](#)
- > [Precipitation - Month to Date | % of Monthly Ave](#)
- > [Snowpack - Percent of Normal Peak](#)
- > [Maps: Snow | Water Year Prec | Monthly Prec](#)

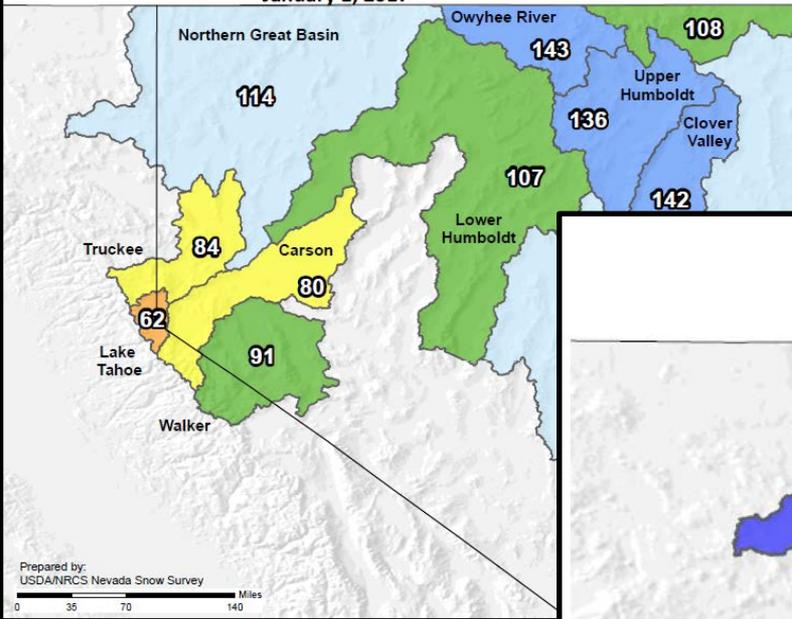


**Nevada Water Supply Outlook Report**  
March 1, 2017

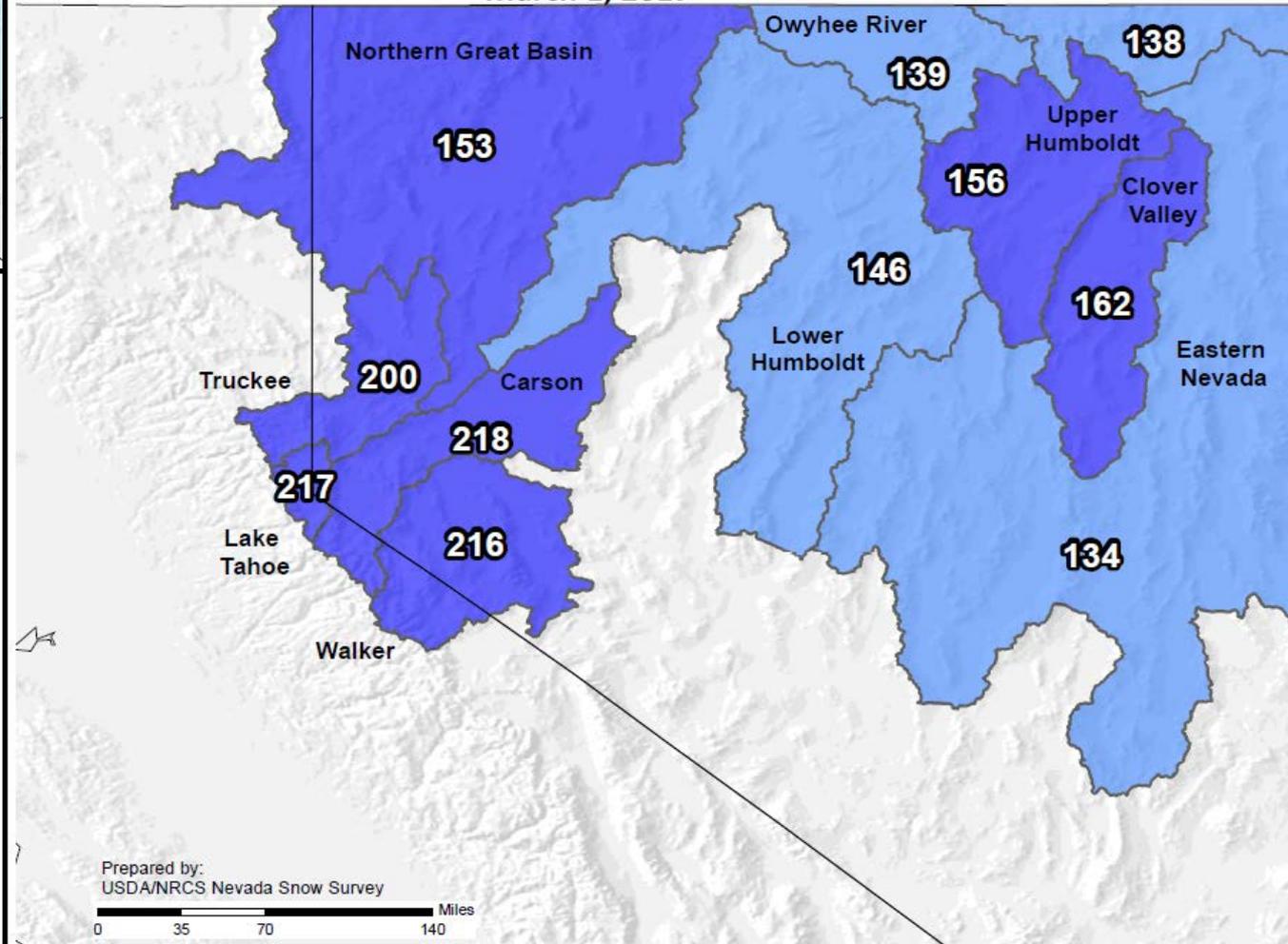
**Winter Extremes - Two Years Apart**

On February 24, 2017, the NRCS measured 200 inches (17 feet) of snow depth and 112 inches of water content in the snowpack at Lake Tahoe. This measurement is the highest recorded based on data from 1953. The measurement also set the record for 200 inches of snow depth and 56 inches of water content. This is the highest snowpack ever recorded at the site. In all, 13 measurements in which rain or snow, and snow or snow in March, are possible this year. Snowpack will also be less off the ground, and the snow will be less in March. Snowpack is expected to be less in 2017 when the snow cover had one of the lowest March snowpacks in 1953. Only 42 inches of snow depth and 25 inches of water content. Snowpack across the entire Sierra Nevada from Lake Tahoe to the base of the Sierra Nevada mountains.

Nevada & Eastern Sierra  
Percent of Median Snowpack  
January 1, 2017

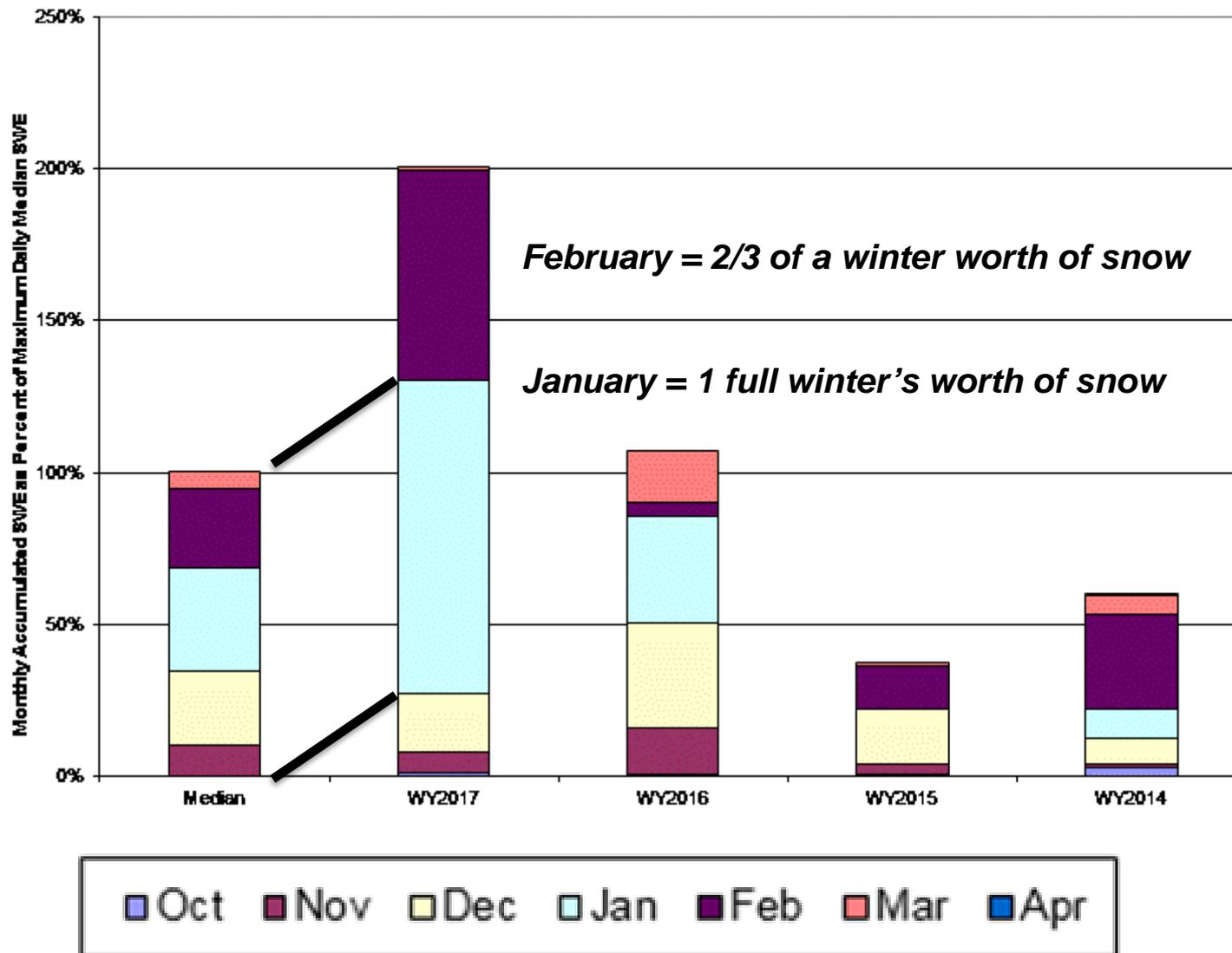


Nevada & Eastern Sierra  
Percent of Median Snowpack  
March 1, 2017



# Carson River Monthly Snowpack Summary

Updated March 4, 2017

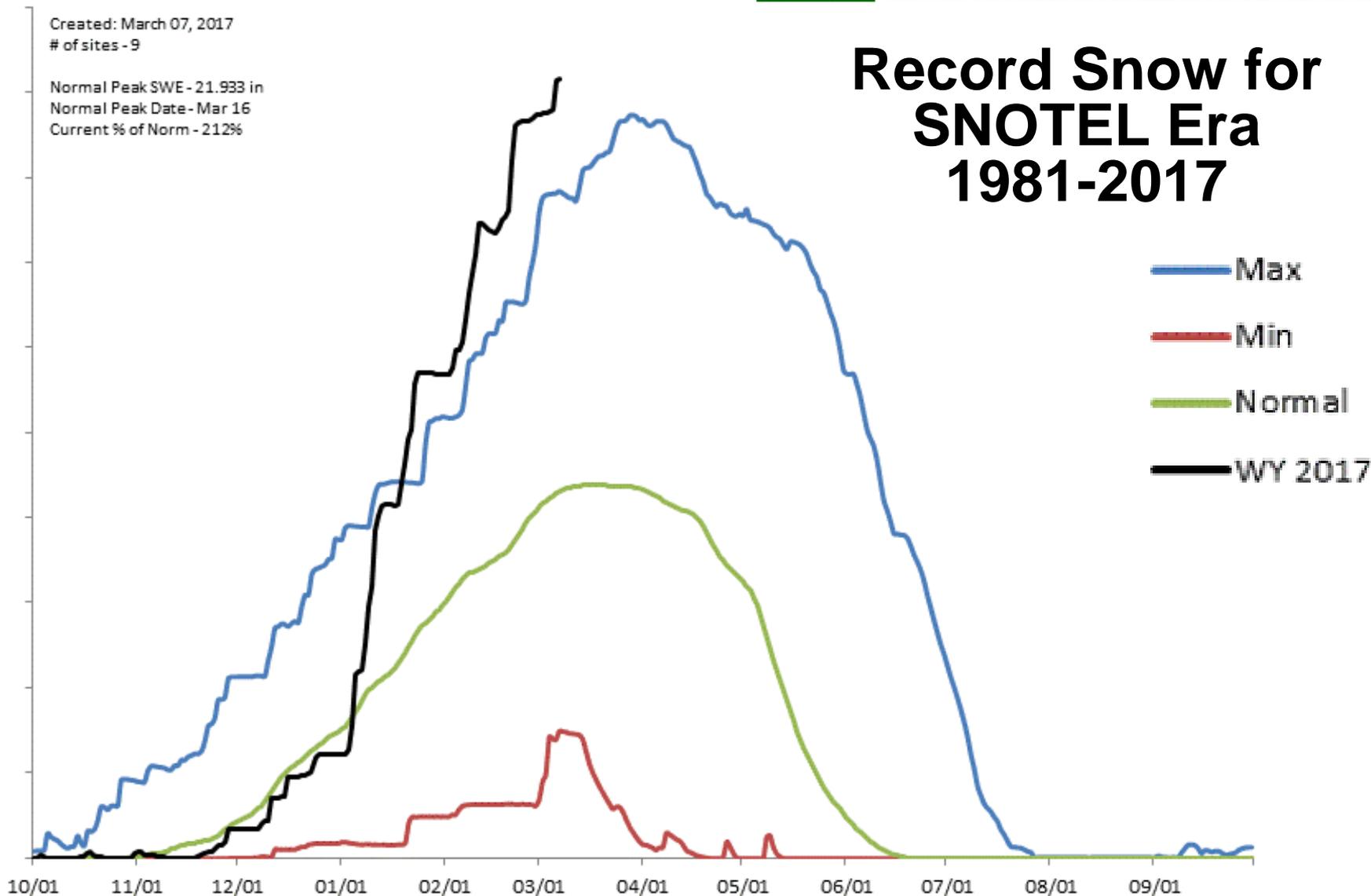


# Carson River Basin - SWE Index

## Record Snow for SNOTEL Era 1981-2017

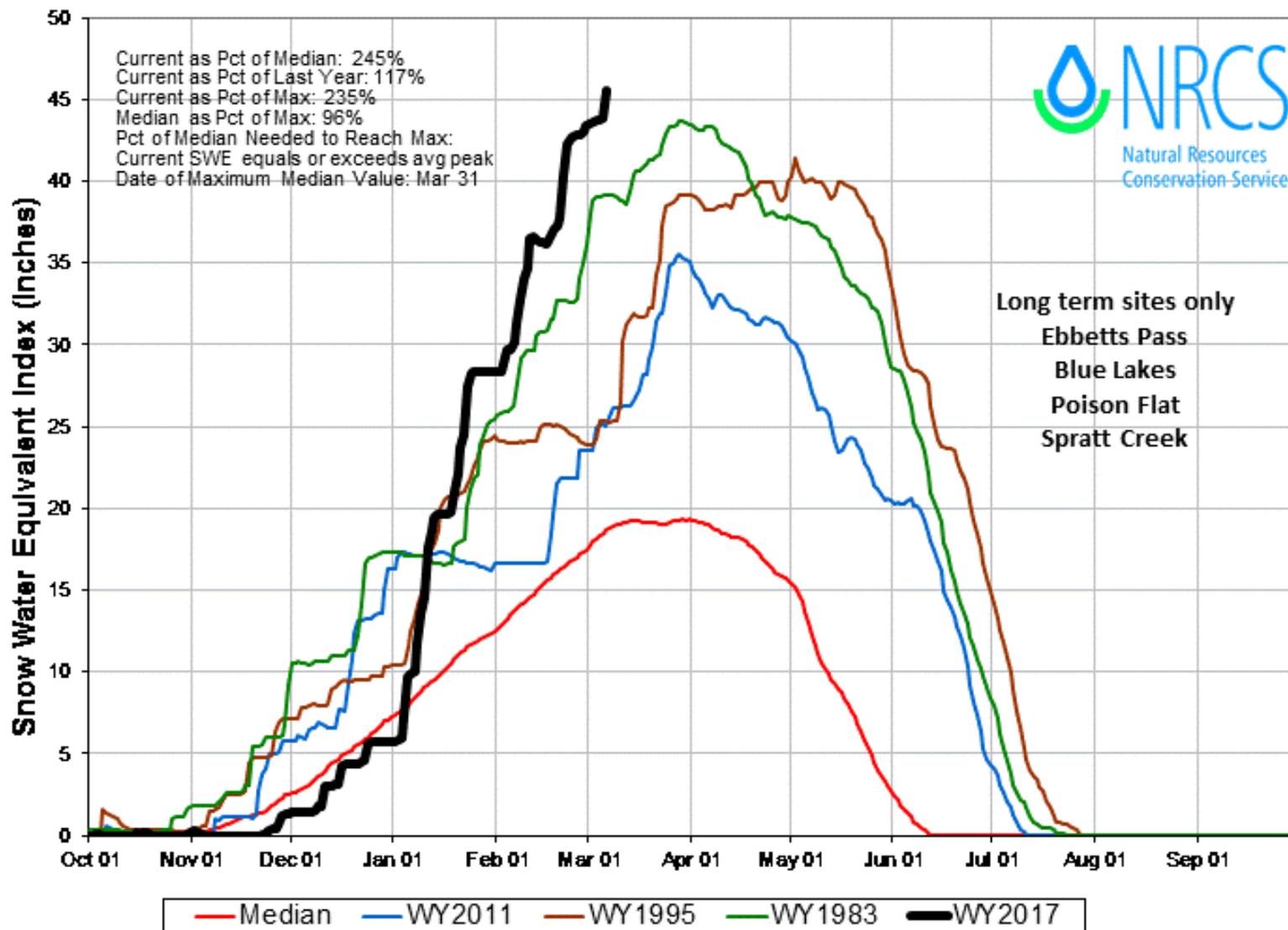
Created: March 07, 2017  
# of sites - 9  
Normal Peak SWE - 21.933 in  
Normal Peak Date - Mar 16  
Current % of Norm - 212%

Index of Snow Water Equivalent



## CARSON RIVER BASIN Time Series Snowpack Summary

### Based on Provisional SNOTEL data as of Mar 06, 2017

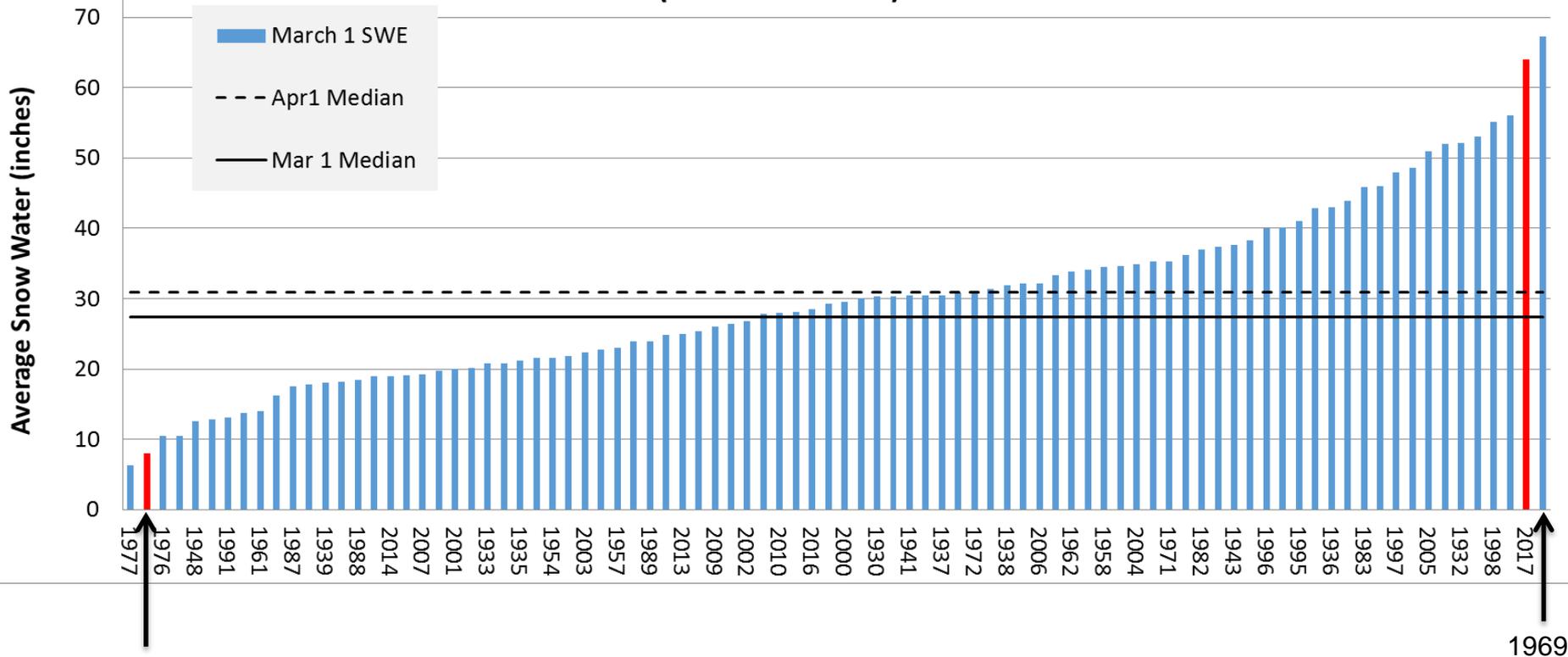


# March 1, 2017 Snow Survey

Carson River Basin	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median
Ebbetts Pass	SNOTEL	8660	163	70.9	28.7	247%
Horse Meadow	SNOTEL	8557	121	41.9	20.1	208%
Upper Carson Pass	SC	8500	163	64.0	27.4	234%
Carson Pass	SNOTEL	8360	138	49.1	25.7	191%
Monitor Pass	SNOTEL	8310	92	29.5	14.9	198%
Burnside Lake	SNOTEL	8129	135	46.5	25.1	185%
Blue Lakes	SNOTEL	8057	116	50.8	24.1	211%
Forestdale Creek	SNOTEL	8017	155	52.7	29.4	179%
Poison Flat	SNOTEL	7736	87	41.1	14.8	278%
Clear Creek	SC	7284	66	24.9	8.0	311%
Spratt Creek	SNOTEL	6060	30	11.0	3.4	324%
<b>Basin Index</b>						<b>218%</b>
# of sites						11



### Carson Pass Upper Snowcourse - Sorted by March 1 SWE (POR 1930-2017)

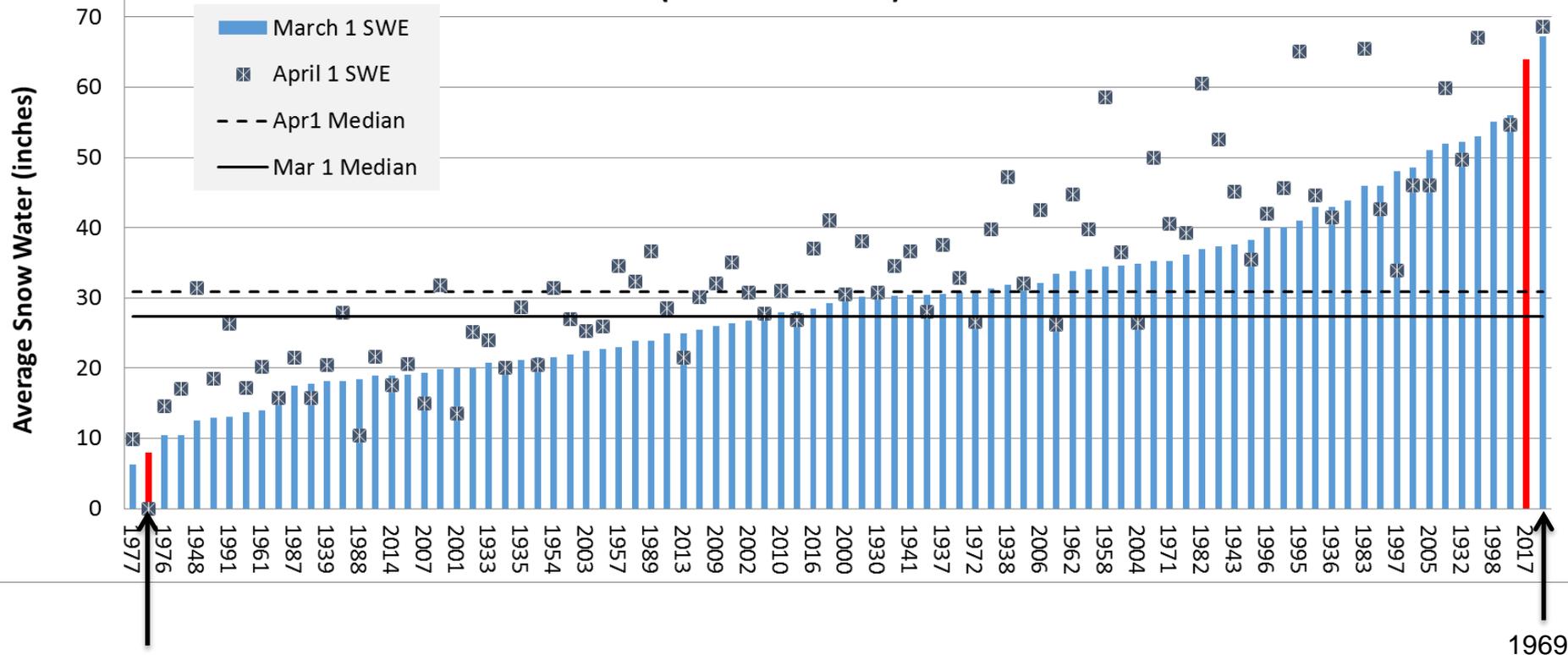


**2<sup>th</sup> highest since 1930**

Year	SWE
1969	67.3
2017	64.0



### Carson Pass Upper Snowcourse - Sorted by March 1 SWE (POR 1930-2017)



**Already 3<sup>rd</sup> highest  
compared to April 1**

Year	SWE
Apr 1 1969	68.6
Apr 1 1952	67.0
Mar 1 2017	64.0



**Of the 15 largest years**

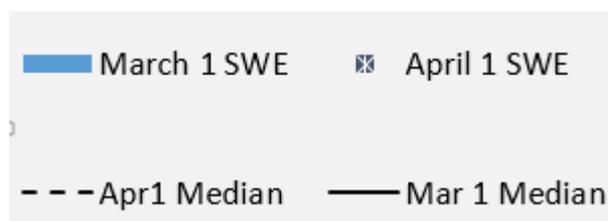
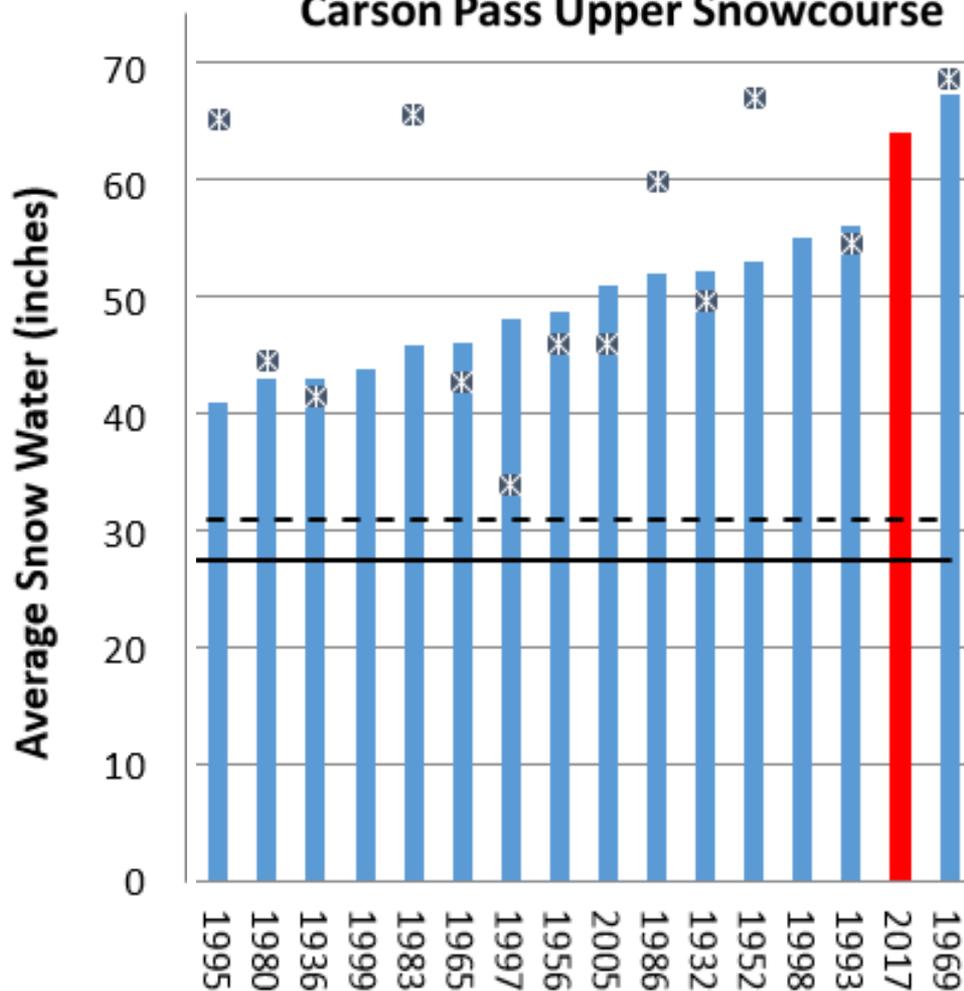
**4 had significant increase  
in SWE by April 1**

**2 had small increase**

**7 had melt decreasing SWE**

**1 was not measured Apr 1**

**Carson Pass Upper Snowcourse**

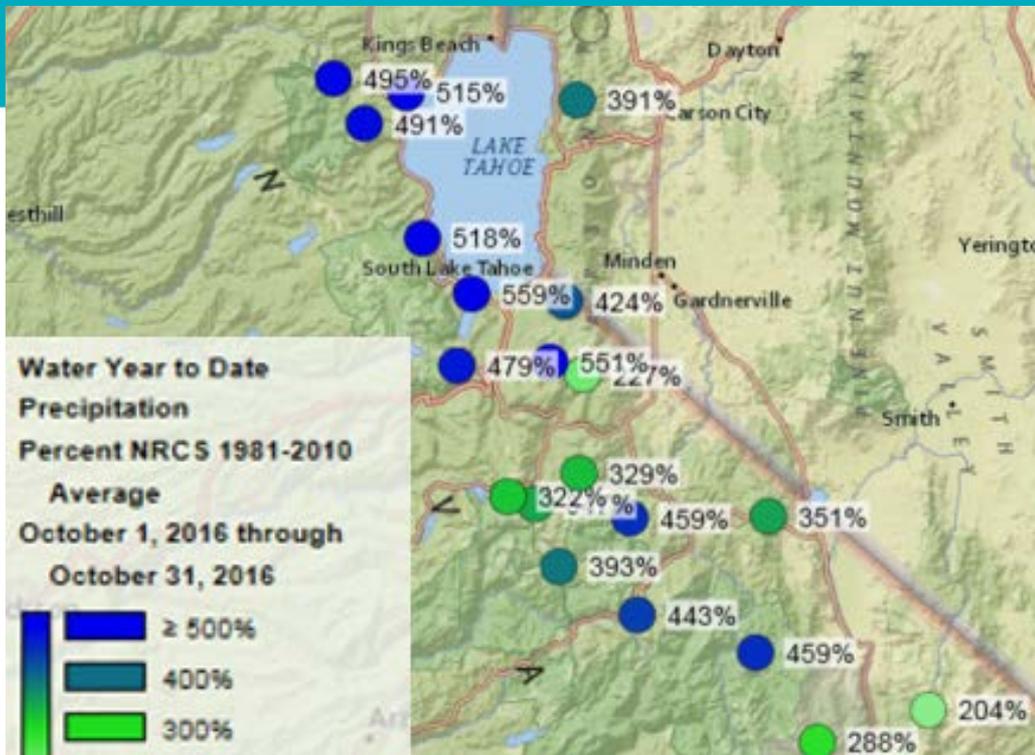


# Record October Precipitation

Imagine if this had come as snow!

## October Precipitation

Basin Site Name	Elev (ft)	Month-to-Date Precipitation		
		Current (in)	Average (in)	Pct of Average
<b>CARSON RIVER</b>				
Ebbetts Pass	8661	13.2	3.0	440
Horse Meadow	8557	4.2	1.8 <sub>R</sub>	233
Carson Pass	8360	11.9	3.7 <sub>R</sub>	322
Monitor Pass	8306	4.0	1.1	364
Burnside Lake	8129	9.7	3.0 <sub>R</sub>	323
Blue Lakes	8067	9.6	2.4	400
Forestdale Creek	8017	13.1	3.8 <sub>R</sub>	345
Poison Flat	7736	8.4	1.8	467
Spratt Creek	6063	9.5	2.1	452
<b>Basin Index (%)</b>				<b>368</b>



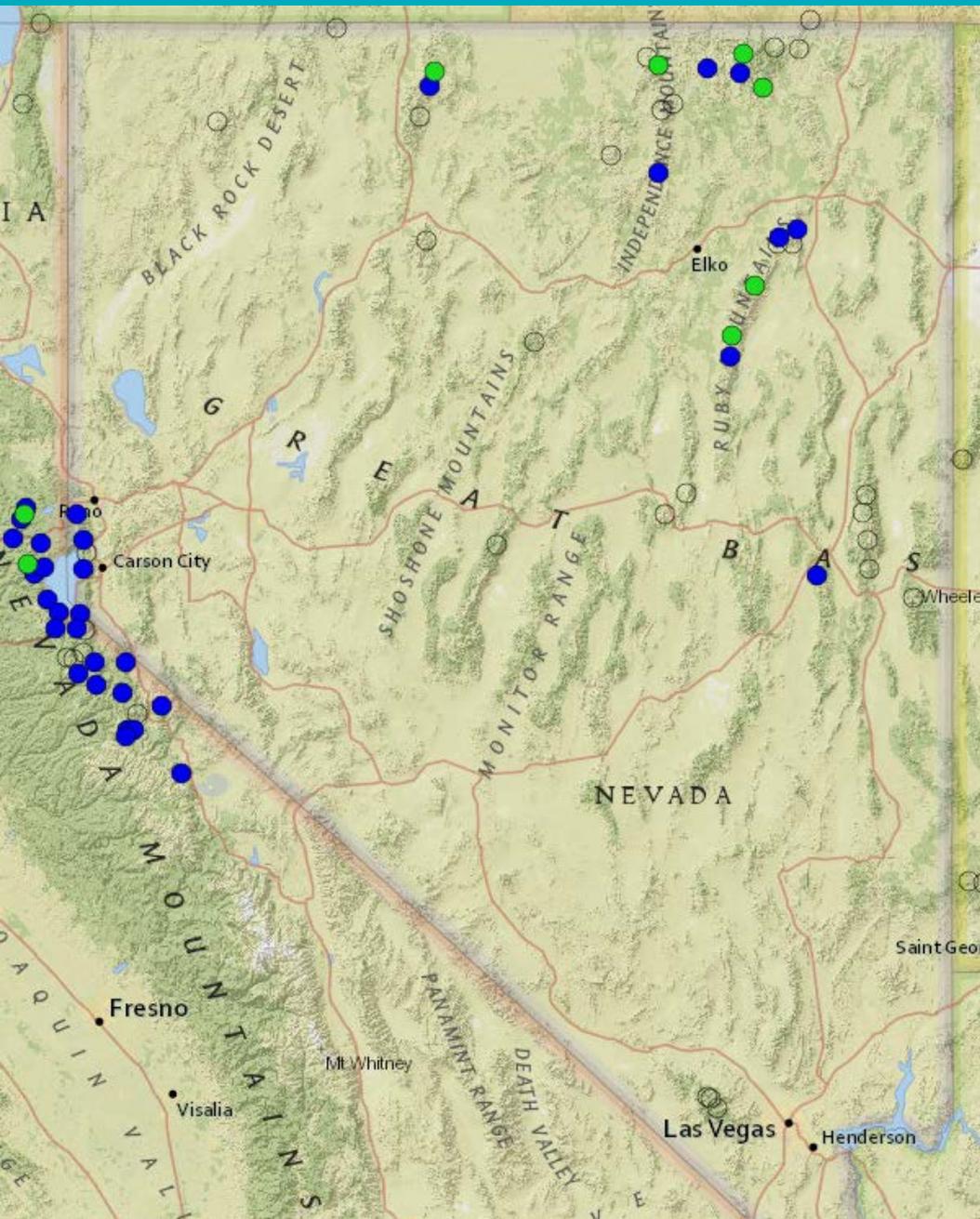
## January Ave Precipitation

8.8
4.9 <sub>R</sub>
8.4 <sub>R</sub>
4.1
7.6 <sub>R</sub>
7.6
8.1 <sub>R</sub>
5.0
5.0

**Wettest October at SNOTEL  
(POR 1981-2017)**

**Wettest October in Tahoe City  
(POR 1909-2017)**

140% of average January



# Biggest January in SNOTEL Era (1981-2017)

Snow Water Equivalent  
Delta  
Records (1981-2010)  
Beginning of February, 2017  
minus  
Beginning of January, 2017

- Highest
- 2nd Highest
- 2nd Lowest
- Lowest

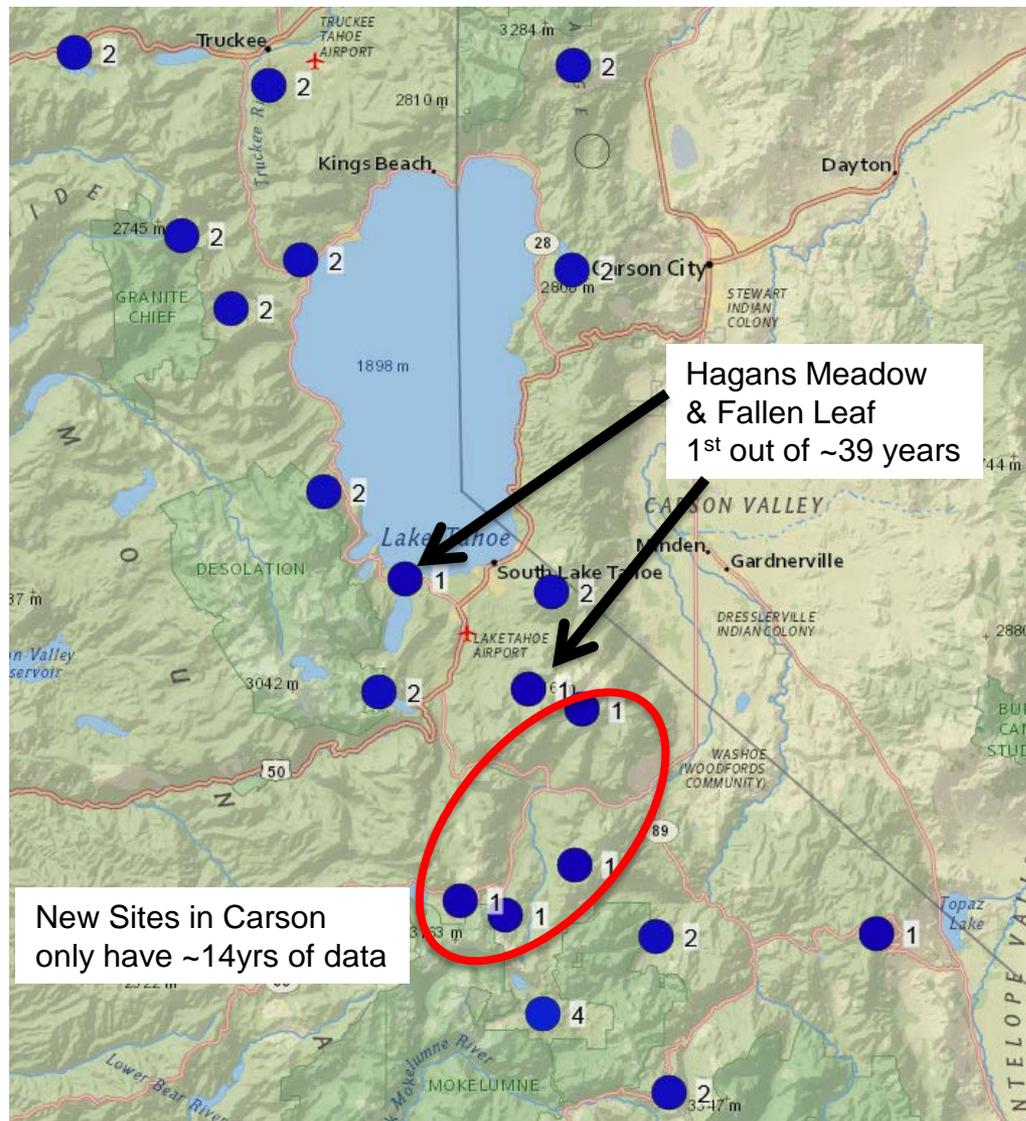
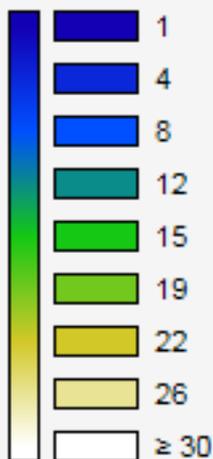
Sites with less than 20 years of data  
or low variability excluded

***2<sup>nd</sup> wettest January after 1969 for  
Tahoe City (1910-2017)***



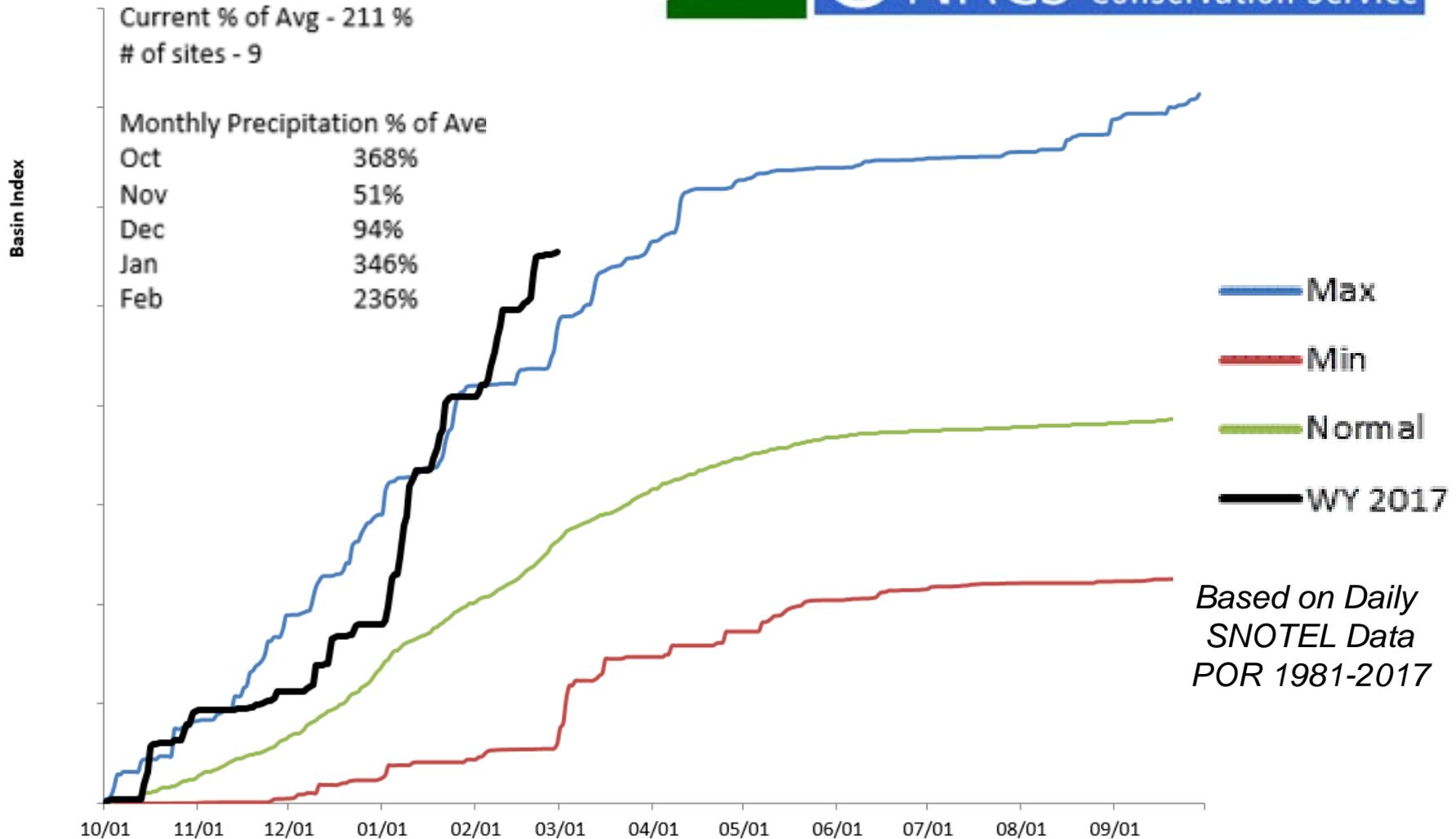
# Second Biggest February in SNOTEL Era (1981-2017)

1 month Precipitation Maximum Rank (POR) February 1, 2017 through February 28, 2017

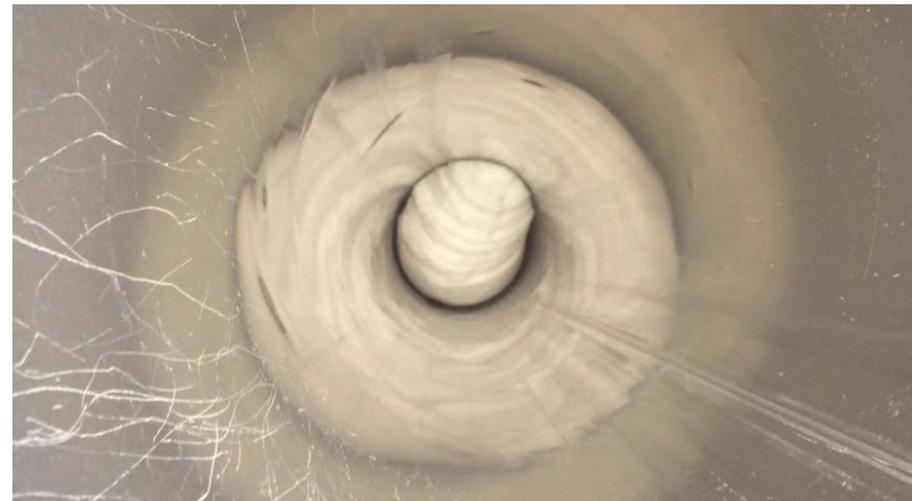
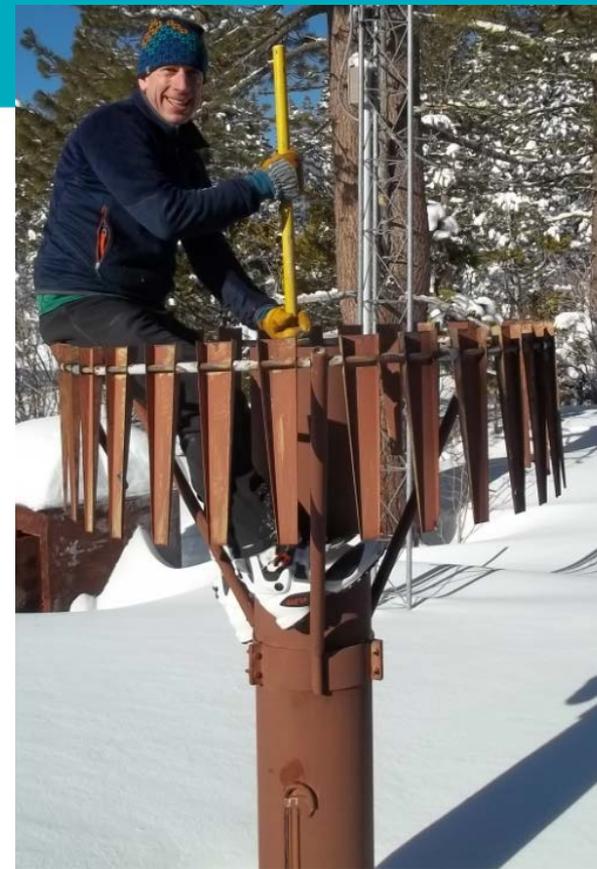
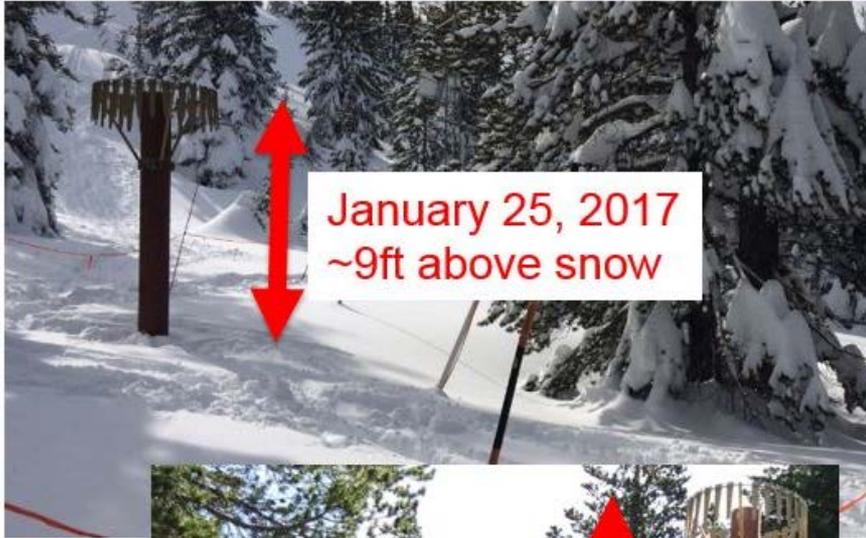


2<sup>nd</sup> wettest February after 1986 for Tahoe City (1910-2017)

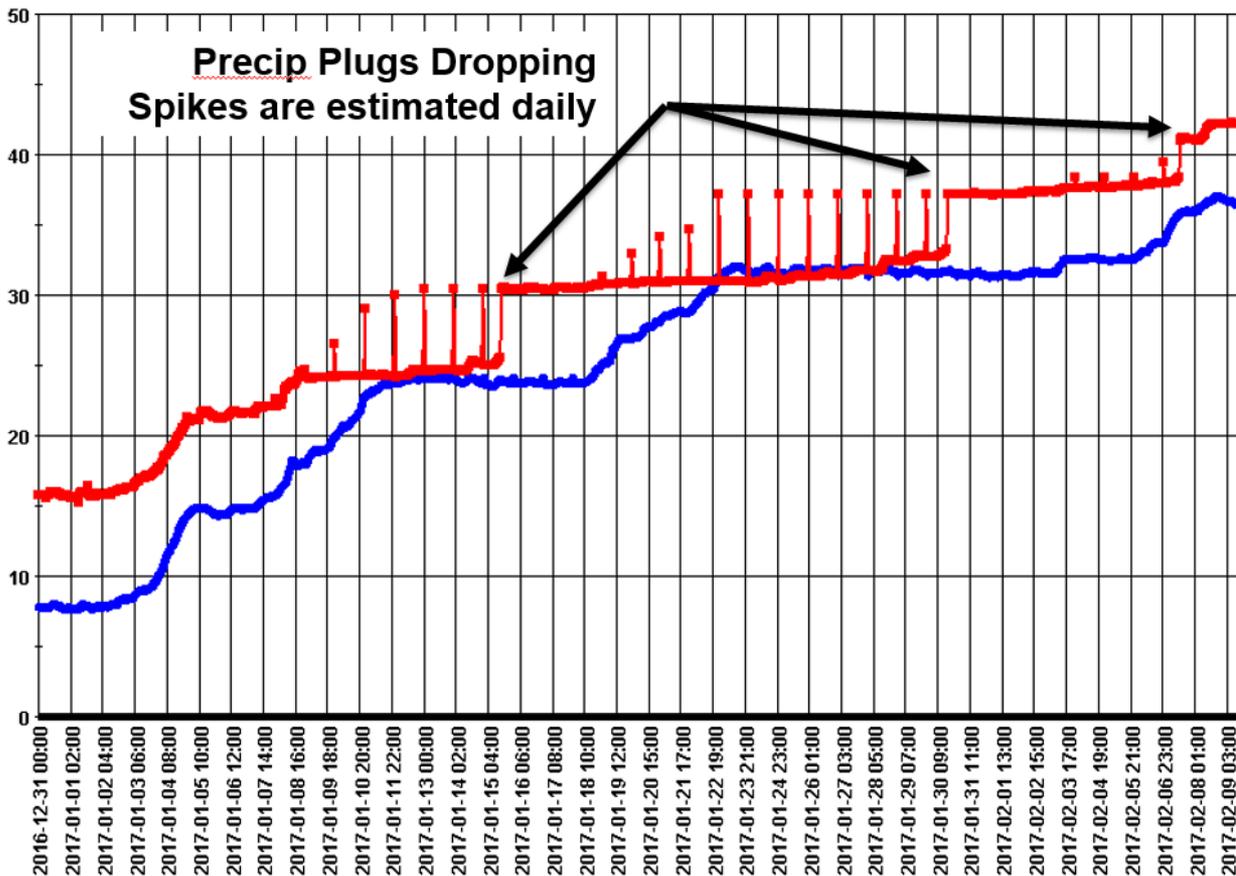
# Carson River Basin Precipitation



# Precipitation Gage Snow Plugs



# Precipitation Estimates based on SWE Increases



Precip

SWE

Current  
Carson Basin  
Precip Plugs (~size)

Blue Lakes (13")  
Burnside Lake (4")  
Carson Pass (14")  
Ebbetts Pass (10")  
Forestdale Ck (12")

Not Plugged  
Horse Meadow  
Monitor Pass  
Poison Flat  
Spratt Creek





Spratt Creek  
SNOTEL

Near Grover  
Hot Springs

WY Prec  
to Date  
54.7"

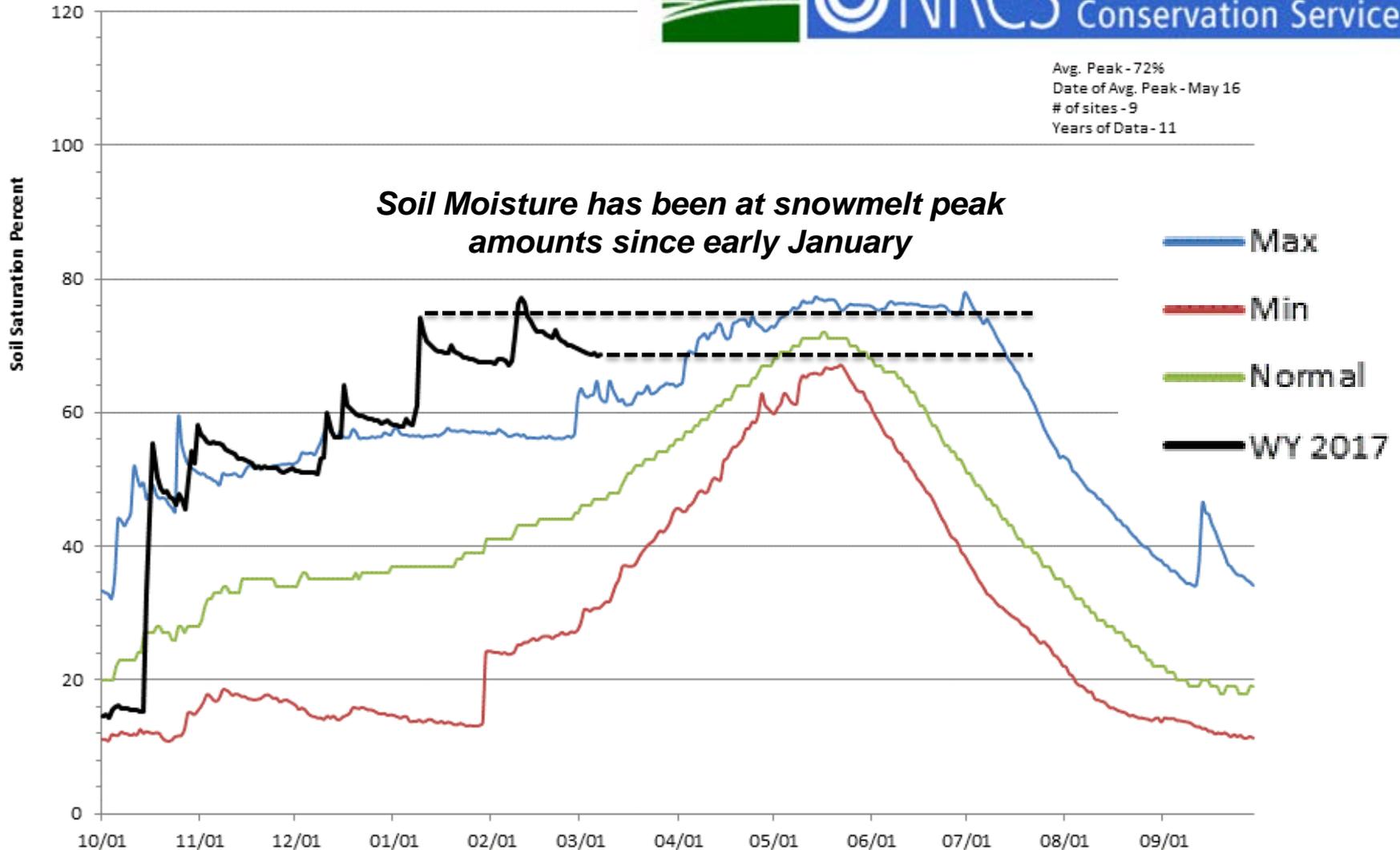
Average  
Annual  
Total  
31.6"



# Carson River Basin - Soil Saturation

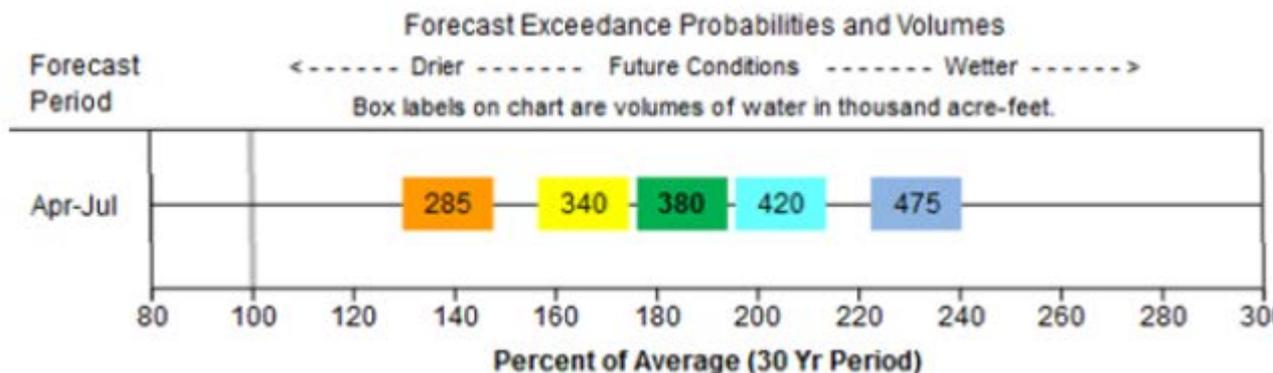


Avg. Peak - 72%  
 Date of Avg. Peak - May 16  
 # of sites - 9  
 Years of Data - 11

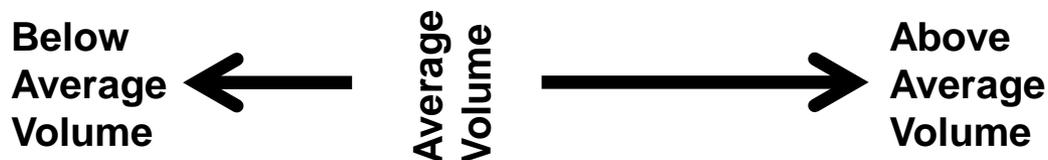


Max, Min and Ave based on Daily SNOTEL Data POR 2006-2016

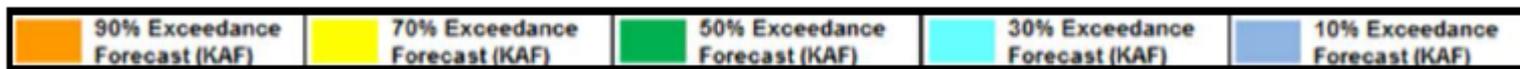
# New Forecast Graphic



Numbers inside boxes are KAF for 5 exceedances

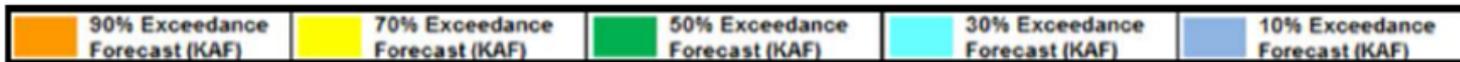
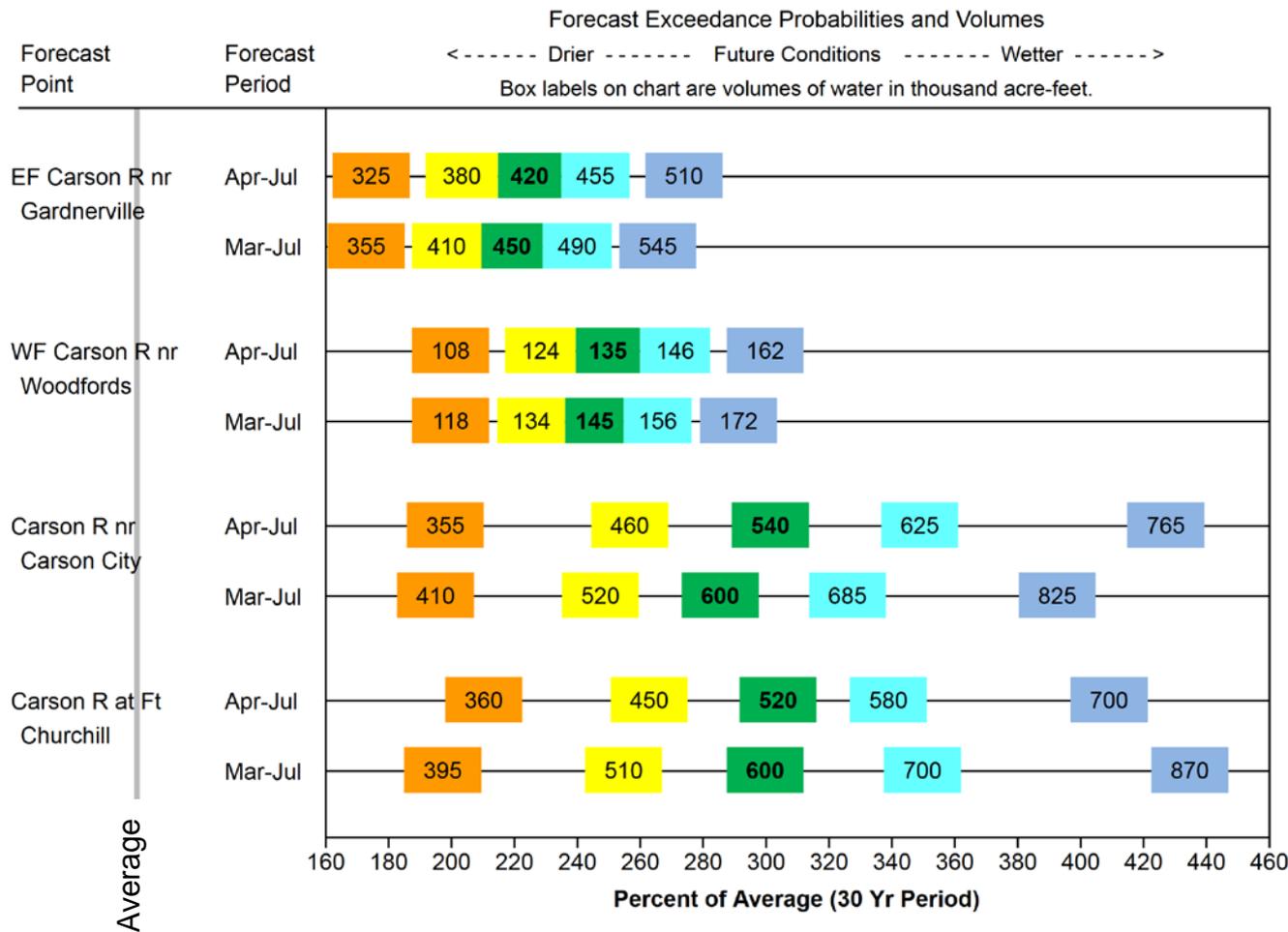


Each colored box represents different exceedance forecasts



← ----- Drier ----- Future Conditions ----- Wetter ----- →

### Carson River Basin Water Supply Forecasts March 1, 2017



<----- Drier ----- Future Conditions ----- Wetter ----->



# March 1, 2017 NRCS Forecasts VS. 2011, 1983 & Record Volumes

Forecast Point	Forecast Period	March 1, 2017 Forecast Exceedances - KAF					2011 KAF	1983 KAF	Record	Record Year
		<---drier future-----wetter future--->								
		90%	70%	50%	30%	10%				
EF Carson R nr Gardnerville	Mar-Jul	356	412	450	488	544	368	478	515	1890
WF Carson R at Woodfords	Mar-Jul	118	134	145	156	172	95	136	166	1907
Carson R nr Carson City	Mar-Jul	410	519	600	687	826	452	589	589	1983
Carson R nr Fort Churchill	Mar-Jul	393	509	600	701	869	441	576	576	1983
Marlette Lake Inflow	Mar-Jul	1.89	2.43	2.8	3.17	3.71	3	4	4	1983
Ash Canyon Creek	Mar-Jul	2.9	3.2	3.4	2.7	3	2.6	3.4	3.4	1983
Kings Canyon Creek	Mar-Jul	0.82	1.11	1.3	1.49	1.78	0.4	1.8	1.8	1983

>2011

>1983

**New  
Record**



# Recession flows are far away...

## Carson River Basin Streamflow Forecasts - March 1, 2017

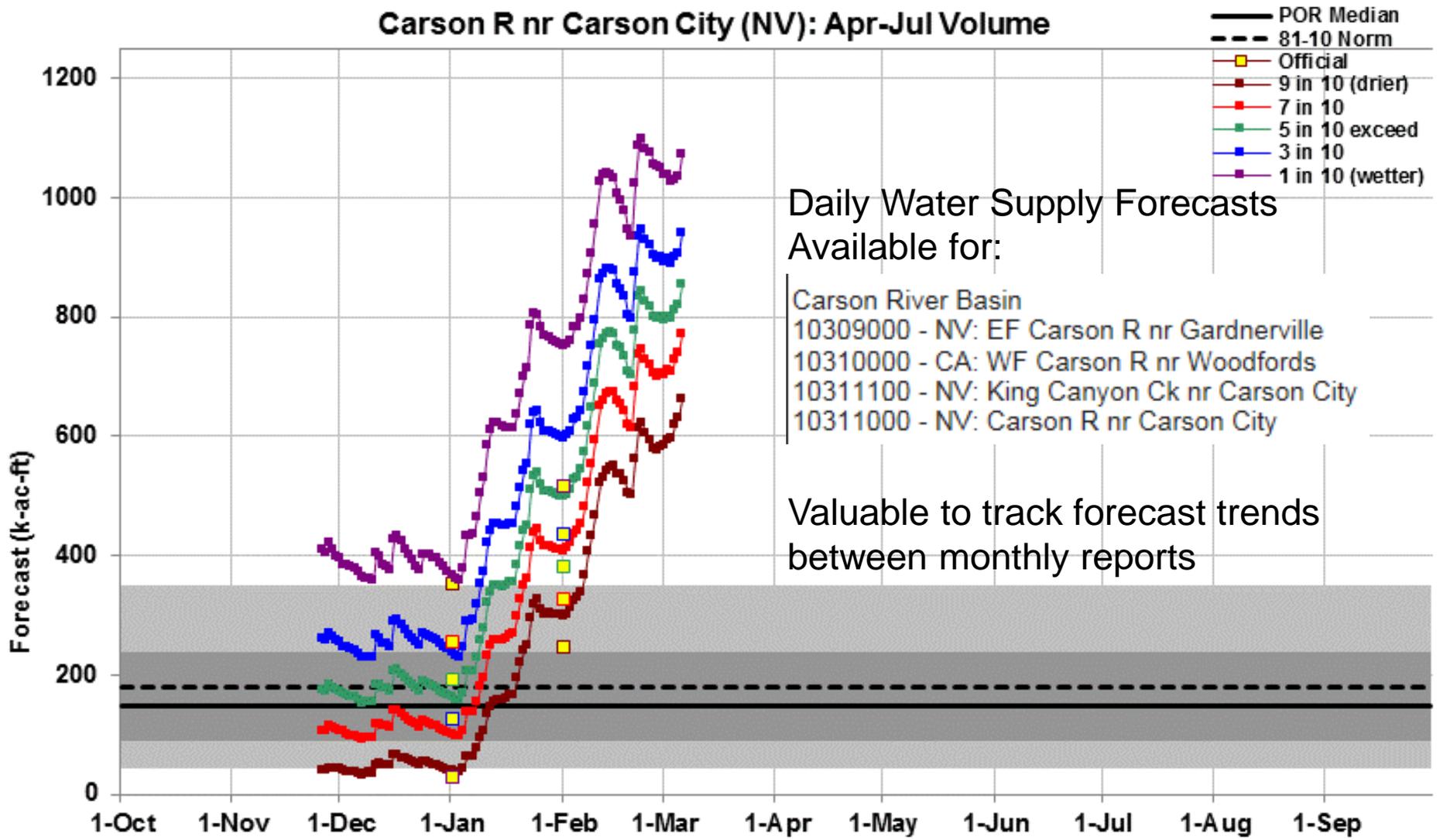
Forecast Exceedance Probabilities for Risk Assessment  
Chance that actual volume will exceed forecast

Carson River Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
EF Carson R nr Gardnerville	MAR-JUL	355	410	450	220%	490	545	205
	APR-JUL	325	380	420	226%	455	510	186
	200 cfs	10 Sep	27 Sep	09 Oct		21 Oct	07 Nov	24 Jul
	500 cfs	12 Aug	28 Aug	07 Sep		17 Sep	03 Oct	30 Jun

For comparison:

Last Year      500cfs = June 26  
                     200cfs = July 12

### Carson R nr Carson City (NV): Apr-Jul Volume



Daily Water Supply Forecasts Available for:

- Carson River Basin
- 10309000 - NV: EF Carson R nr Gardnerville
- 10310000 - CA: WF Carson R nr Woodfords
- 10311100 - NV: King Canyon Ck nr Carson City
- 10311000 - NV: Carson R nr Carson City

Valuable to track forecast trends between monthly reports

# Boom or Bust

