

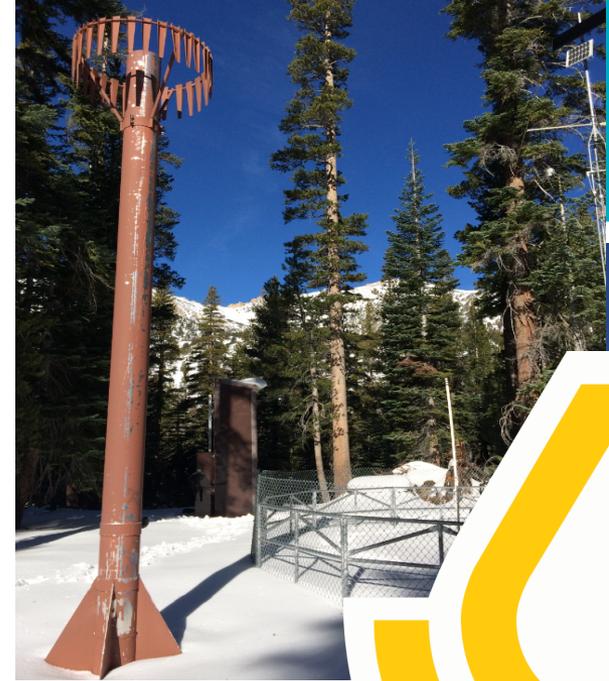
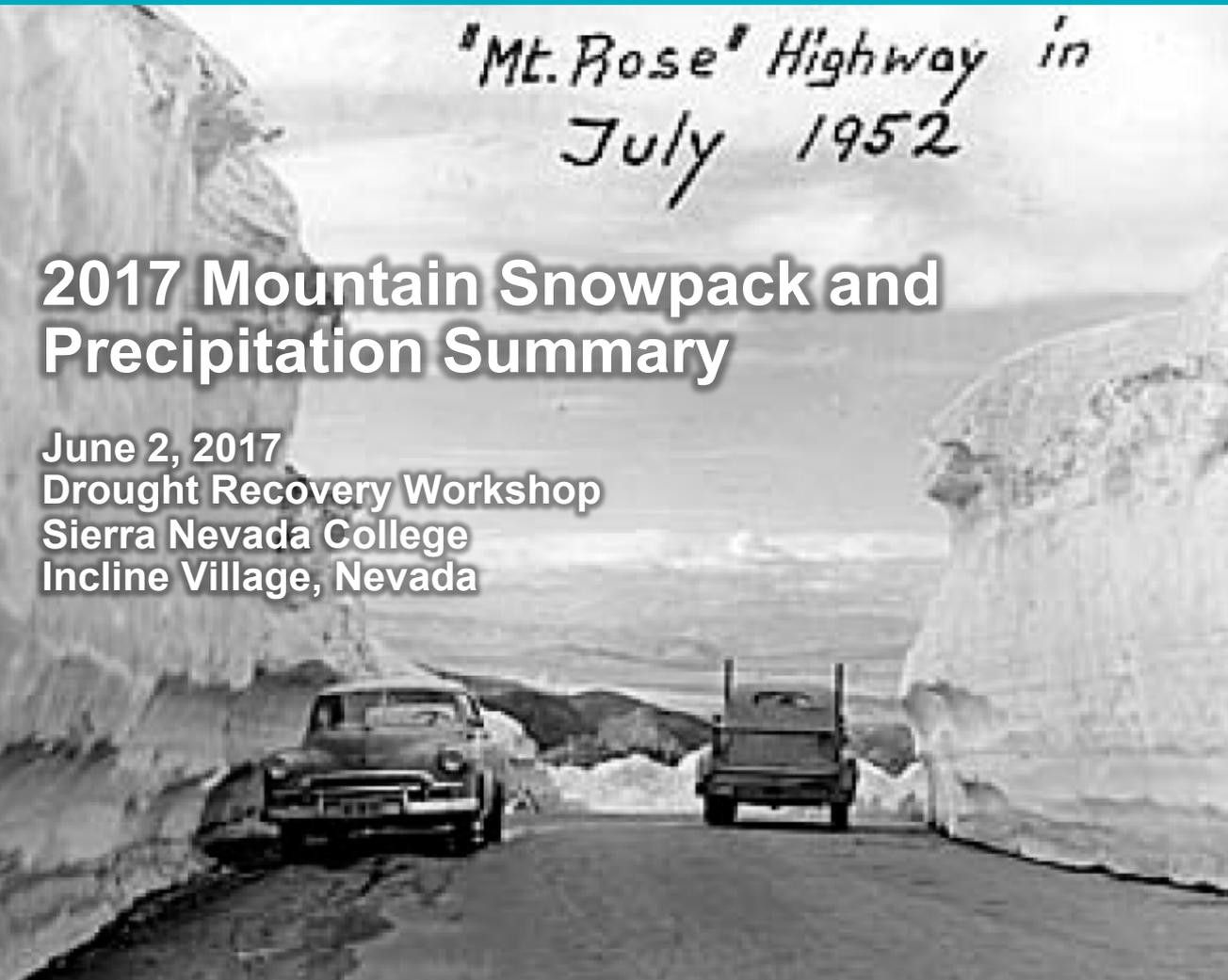


United States Department of Agriculture

*'Mt. Rose' Highway in
July 1952*

2017 Mountain Snowpack and Precipitation Summary

June 2, 2017
Drought Recovery Workshop
Sierra Nevada College
Incline Village, Nevada



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Nevada NRCS Snow Survey

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Natural
Resources
Conservation
Service

www.nv.nrcs.usda.gov/snow

NRCS Monitoring Network

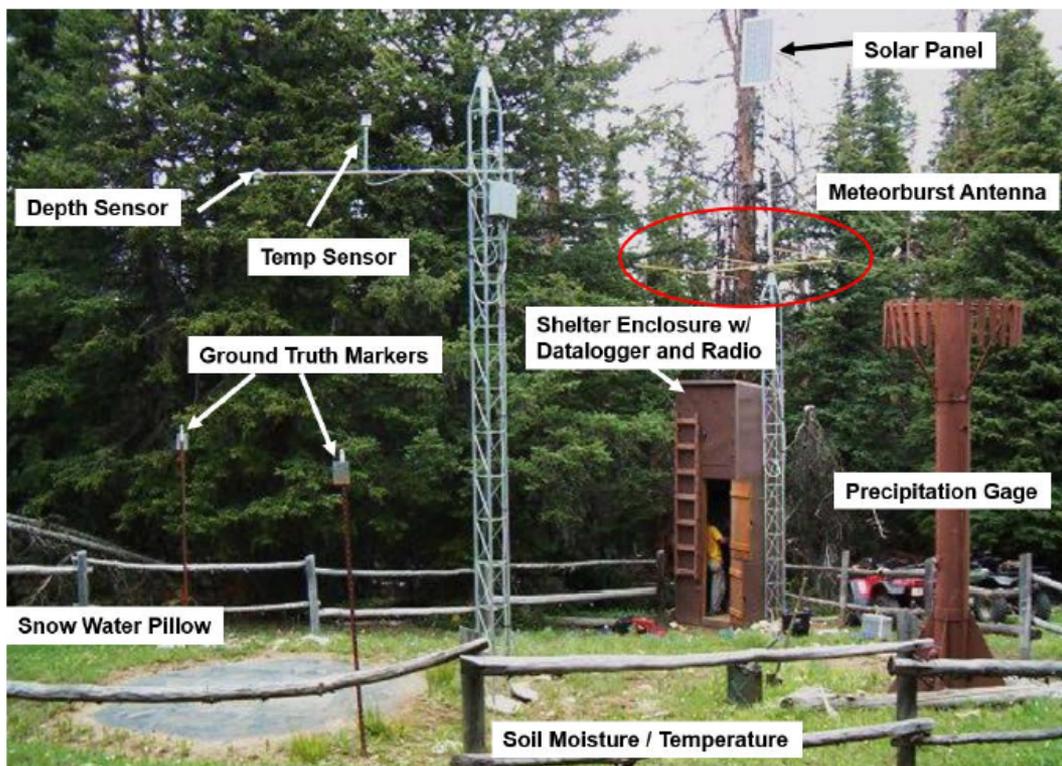
Snow Courses

snow tube transect



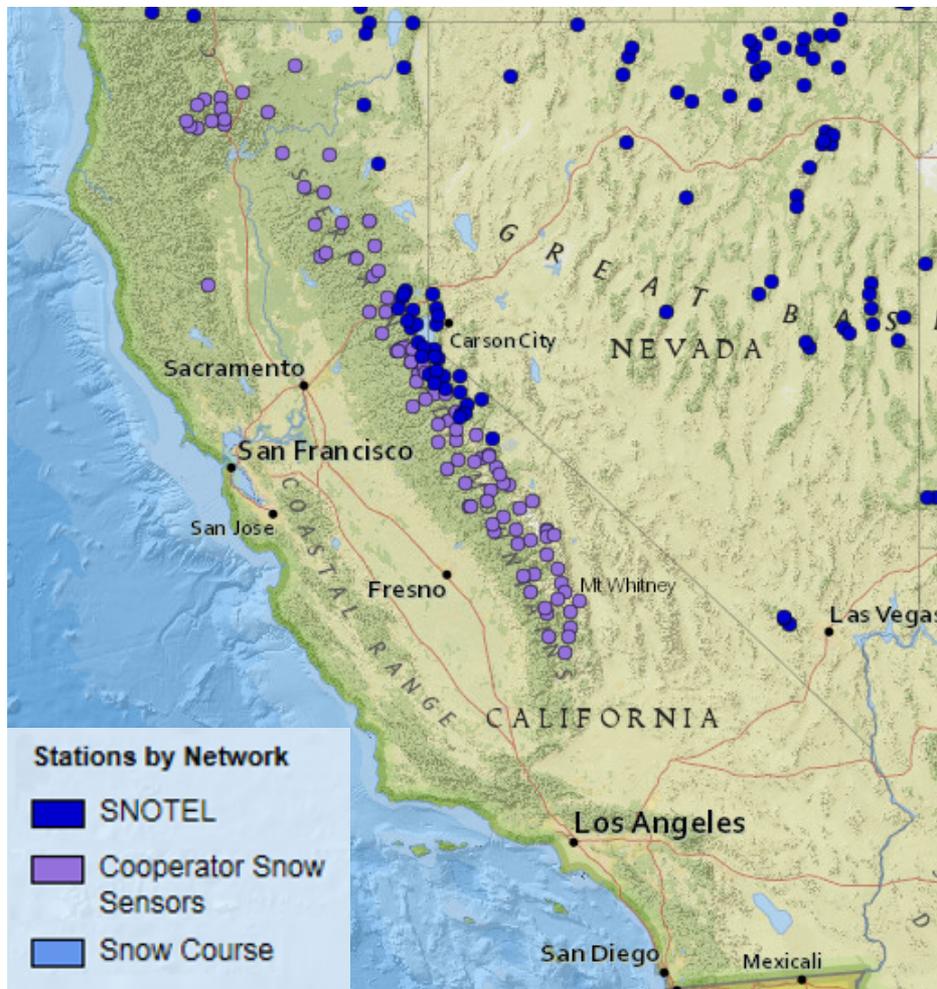
SNOTEL Stations

*automated weather station
with snow pillow*



Key Vocabulary:
Snow Water Equivalent (SWE)

NRCS / CA-DWR Cooperative Snow Survey Network

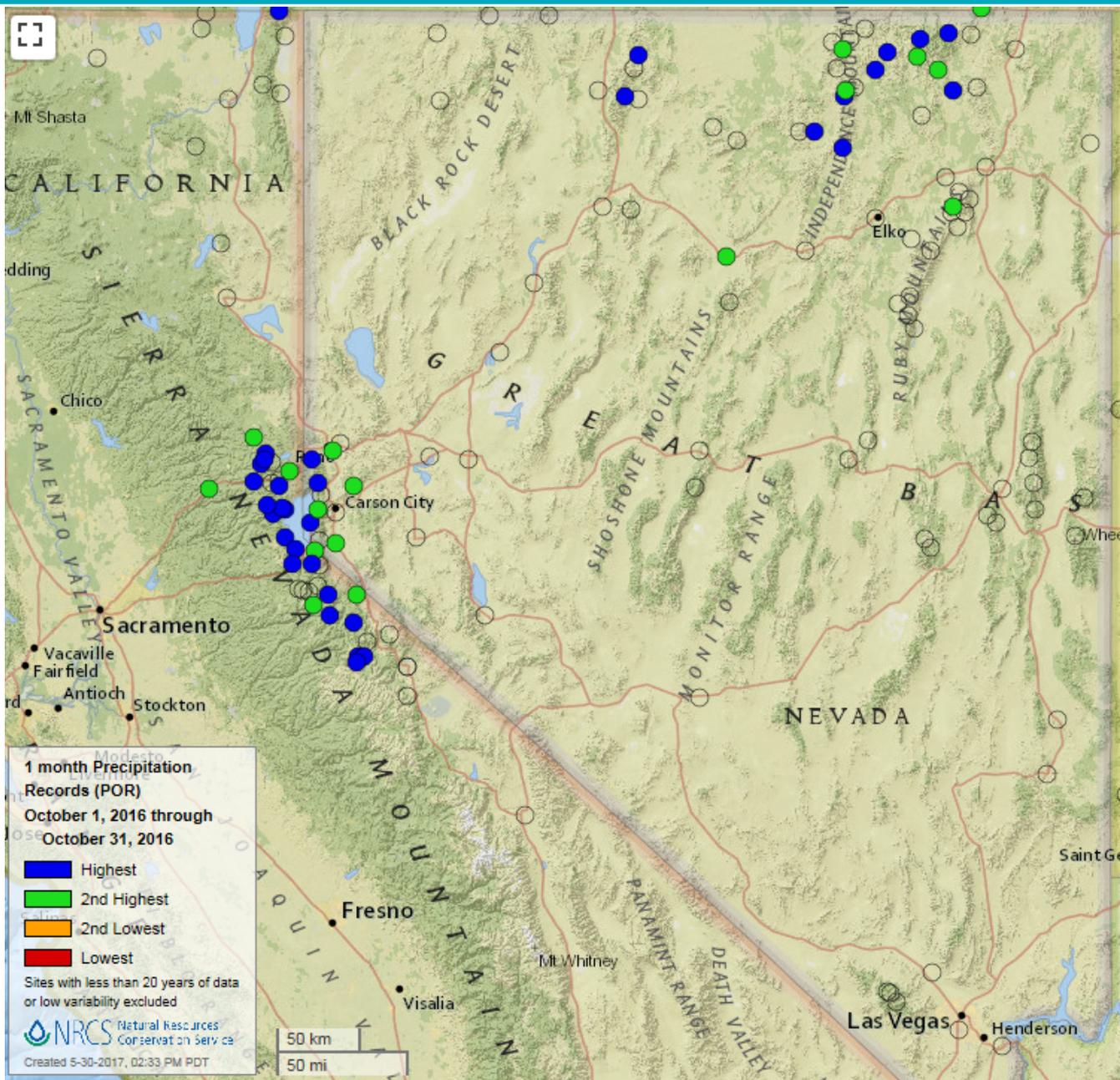


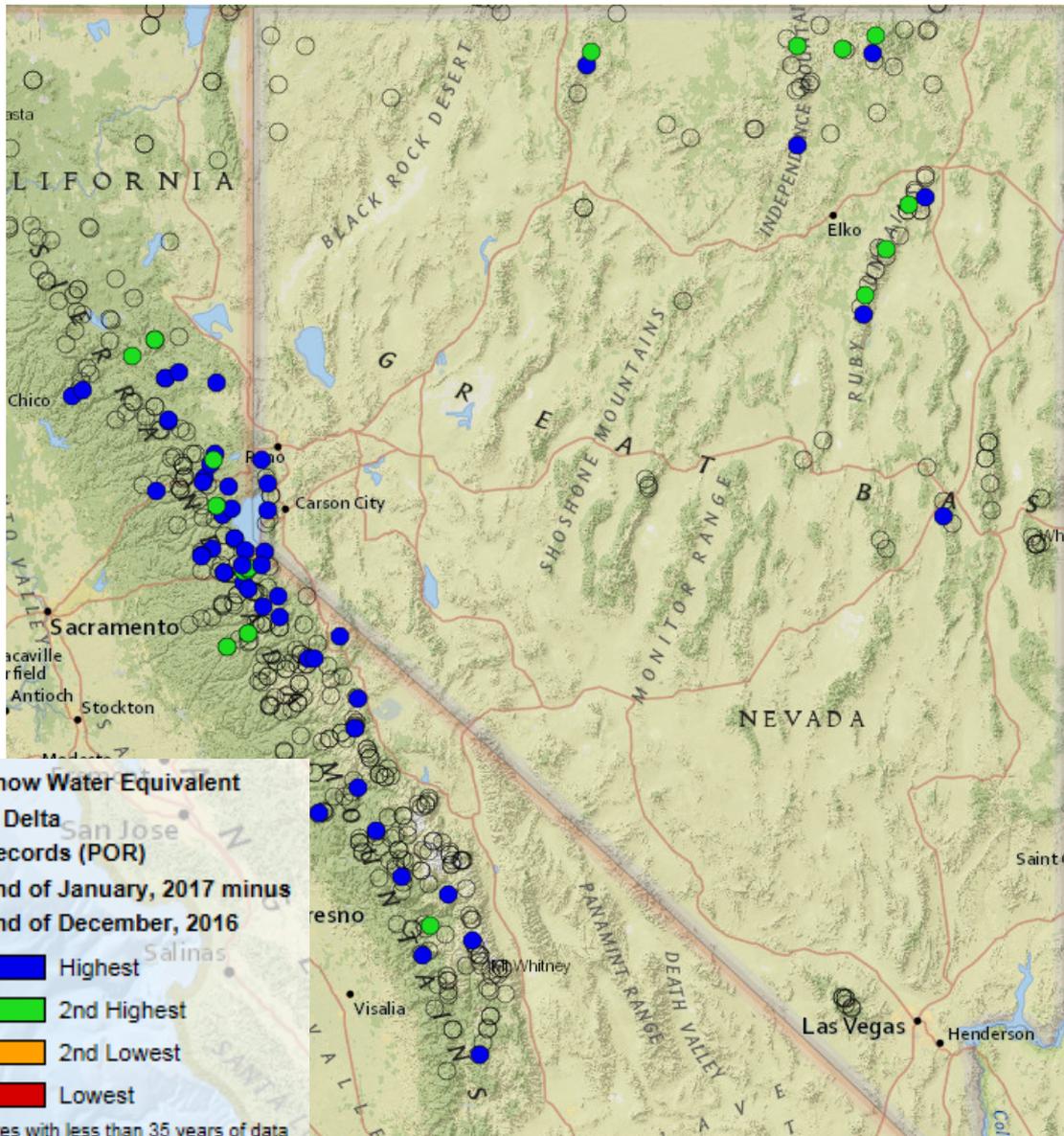
Record October Precipitation

5 times average
precipitation at
SNOTEL sites
(up to 20")

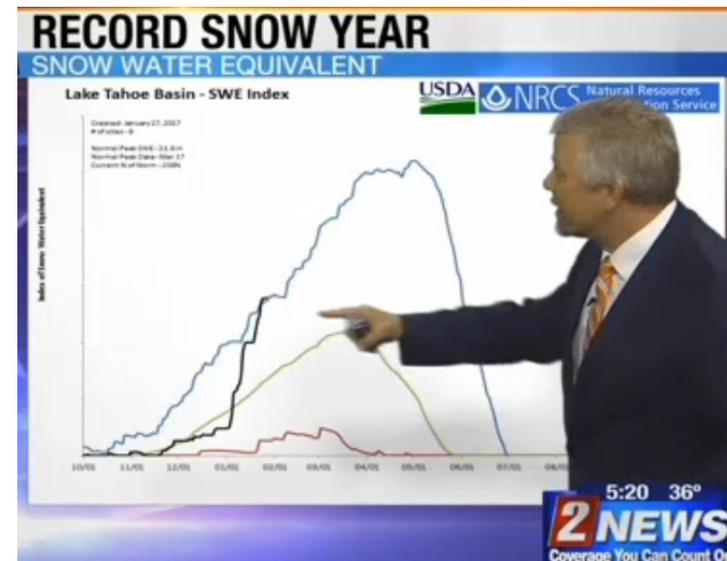
3rd wettest October
since 1900 at Central
Sierra Snow Lab
Donner Summit

October snowfall was
limited, but imagine
the winter if these
storms had come in
cold.





Biggest January in SNOTEL Era (1981-2017)



**2nd biggest January for
Tahoe City - Stone
precipitation
gauge back to 1910**

Snow Water Equivalent
Delta
Records (POR)
End of January, 2017 minus
End of December, 2016

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

Sites with less than 35 years of data or low variability excluded

 Natural Resources Conservation Service

#Januburied

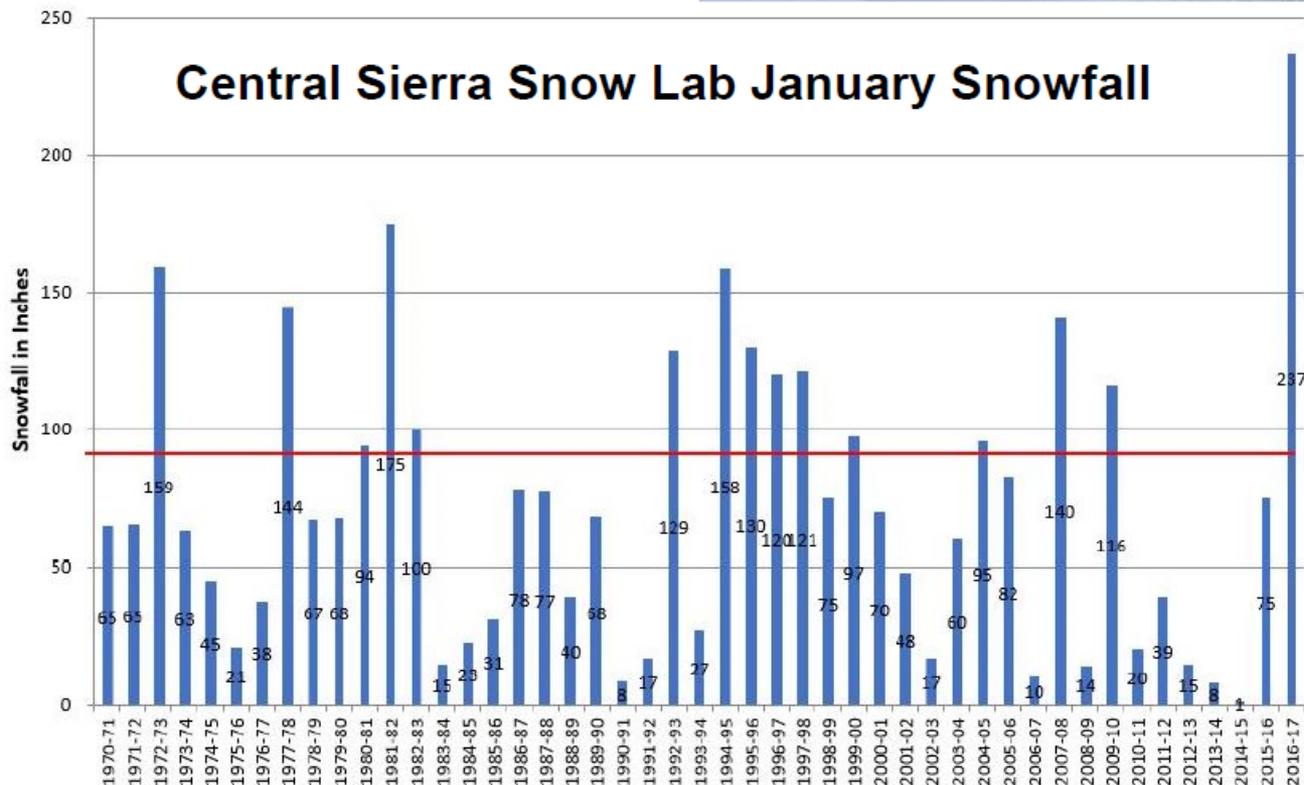
Mt Rose Ski Tahoe
295 inches of snowfall
January 2017, new record



NDOT's rotary plows clearing Slide Mountain Road, January 2017

Photo Credit: Dave Hahl, Mountain Manager, Mt Rose Ski Tahoe

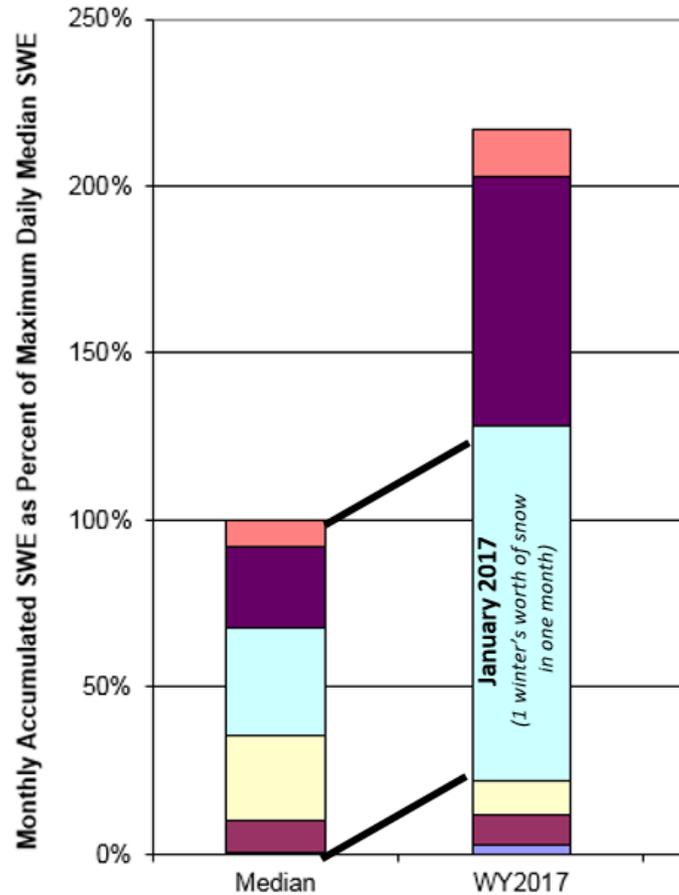
Central Sierra Snow Lab January Snowfall



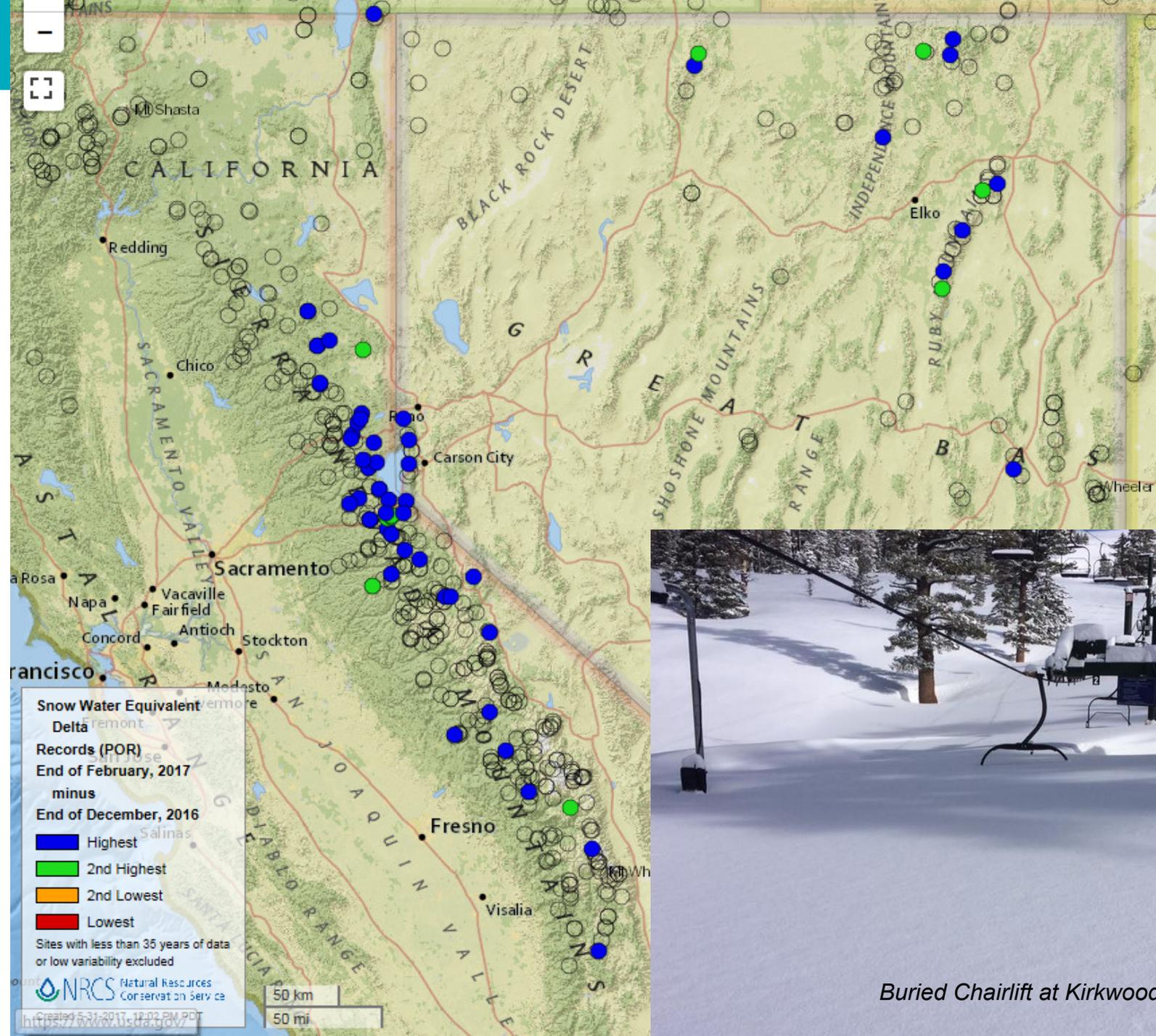
CSS Lab snowfall (6900ft)
Jan 2017 = 237inches
Old record
Jan 1982 = 175inches

Beat all time monthly record Mar 1992 = 201in

LAKE TAHOE BASIN Time Series Monthly Snowpack Summary
Based on Provisional SNOTEL data as of Apr 14, 2017



Biggest Jan-Feb in last 35 years



Buried Chairlift at Kirkwood Ski Resort, Jan 2017

Snow Removal Costs:

- Between Jan 5-14, 2017 NDOT paid \$245,000 for labor, equipment, and materials.
- In total \$24 million spent on road repair due to the damages caused directly and indirectly by the January and February storms.



With measurements taking 2-3 hours to complete, headline should have read:

...media doesn't have enough patience to measure snowpack. 😊

USA TODAY Search

NEWS SPORTS LIFE MONEY TECH TRAVEL OPINION 47° CROSSWORDS WASHINGTON VIDEO MORE

Out West, the snow is so deep that scientists don't have any tools to measure it

USA TODAY NETWORK Benjamin Spillman, Reno (Nev.) Gazette-Journal Published 1:12 a.m. ET March 2, 2017 | Updated 2 hours ago

California's wild winter of incredible snowfall has scientists struggling to even measure it. Nathan Rousseau Smith (@fantasticmrnate) has the story. Buzz60

RENO, Nev. — One sure sign the Sierra Nevada is experiencing a historic winter is the snowpack is getting too deep for devices scientists use to measure it.

It's a problem that cropped up Wednesday when researchers sought to confirm snow depth at a data site on Slide Mountain at Mount Rose Ski Tahoe near Reno.

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Professional Wrestling Inspired Sampling Technique



*Seth Collins
Signature Curb Stomp*



*Jeff Anderson
Signature Tube Stomp*



Photo Credit: UNR Archive



Dr. Church's best Pile Driver



UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE SCS-ENG-708 3-86

FEDERAL-STATE-PRIVATE COOPERATIVE SNOW SURVEYS

Snow Course Lake Lucille

Drainage Basin Lake Tahoe State CA

Sampler Cole/Gwosder Note Taker Anderson

Date 4/1/2017 Began 7:41 a.m. Ended 7:29 a.m.

Sample Number	Depth of Snow Inches	Length of Core Inches	Weight of Tube and Core	Weight of Empty Tube	Water Content Inches	Density Percent	Remarks (See reverse)
1A	129	119	134	83	51	40	4 tubes

Lake Lucille Snow Course Lake Tahoe 4/1/17

UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE SCS-ENG-708 3-86

FEDERAL-STATE-PRIVATE COOPERATIVE SNOW SURVEYS

Snow Course Lake Lucille

Drainage Basin Lake Tahoe State CA

Sampler _____ Note Taker _____

Date 4/1/2017 Began _____ a.m. Ended _____ a.m.

Sample Number	Depth of Snow Inches	Length of Core Inches	Weight of Tube and Core	Weight of Empty Tube	Water Content Inches	Density Percent	Remarks (See reverse)
1B	198						
1C	198						
Total	198						
2A	201						
2B	201						
3A	106	105	181	138	43	40	8 tubes + w
3B	146	145	160	138	22		" "
3C	201.5	164	174	138	30		" "
3D	213.5	8	141	138	3		" "
					104	49	
4A	167	99	185	138	47	44	8 tubes + w
4B	162	160	170	138	32		
4C	215.5	56	168	138	30		
					101	51	
5A	121	119	167	120	47	39	8 tubes
5B	220.5	177.5	130	81	49		6 tubes
5C	255	45	180	152	28		9 tubes
					124	49	
Total	1083				539	50%	
Ave	217				107.8		3rd highest since 1913

No. of tube sections used. _____

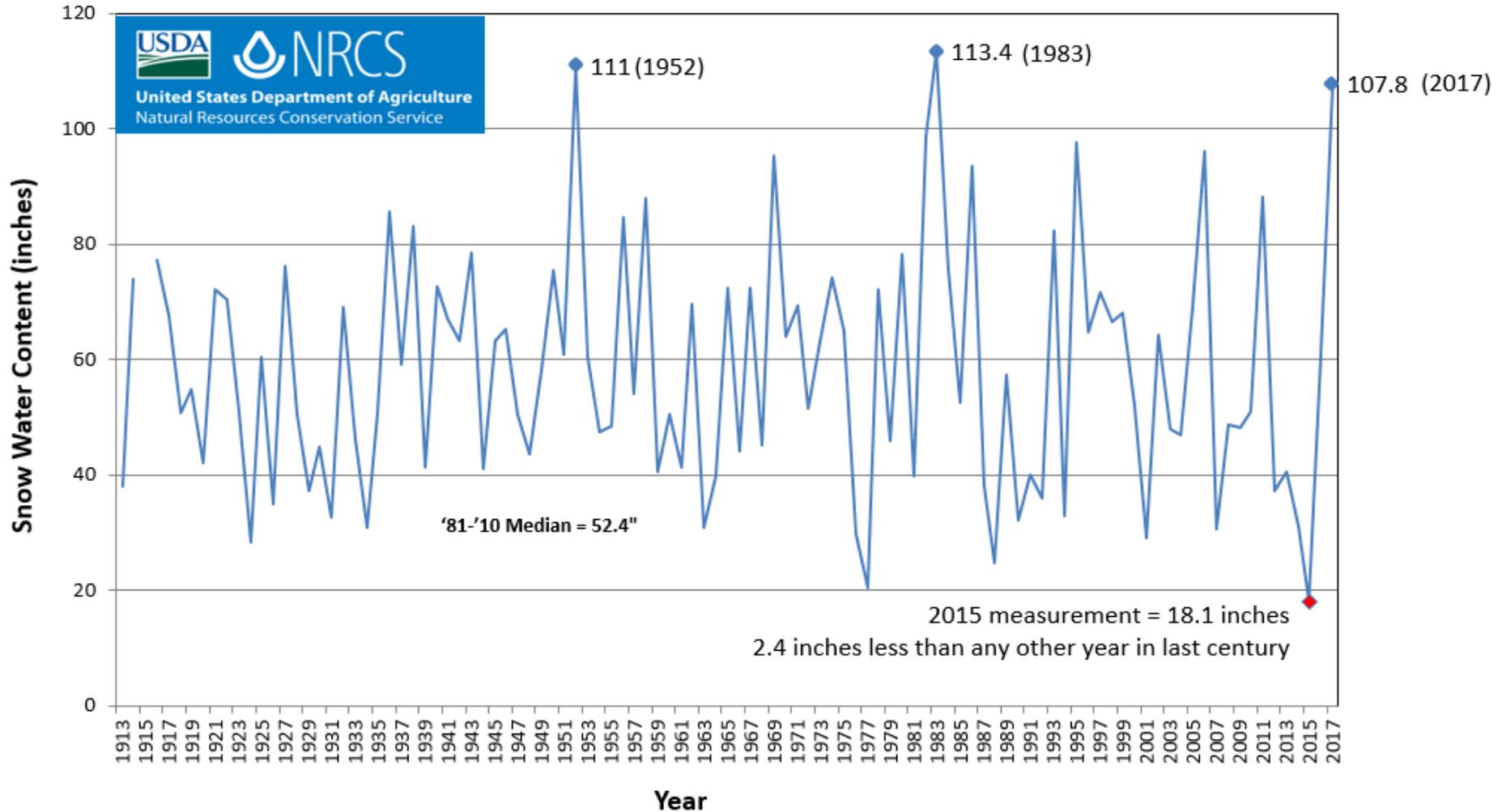
Was driving wrench used? _____

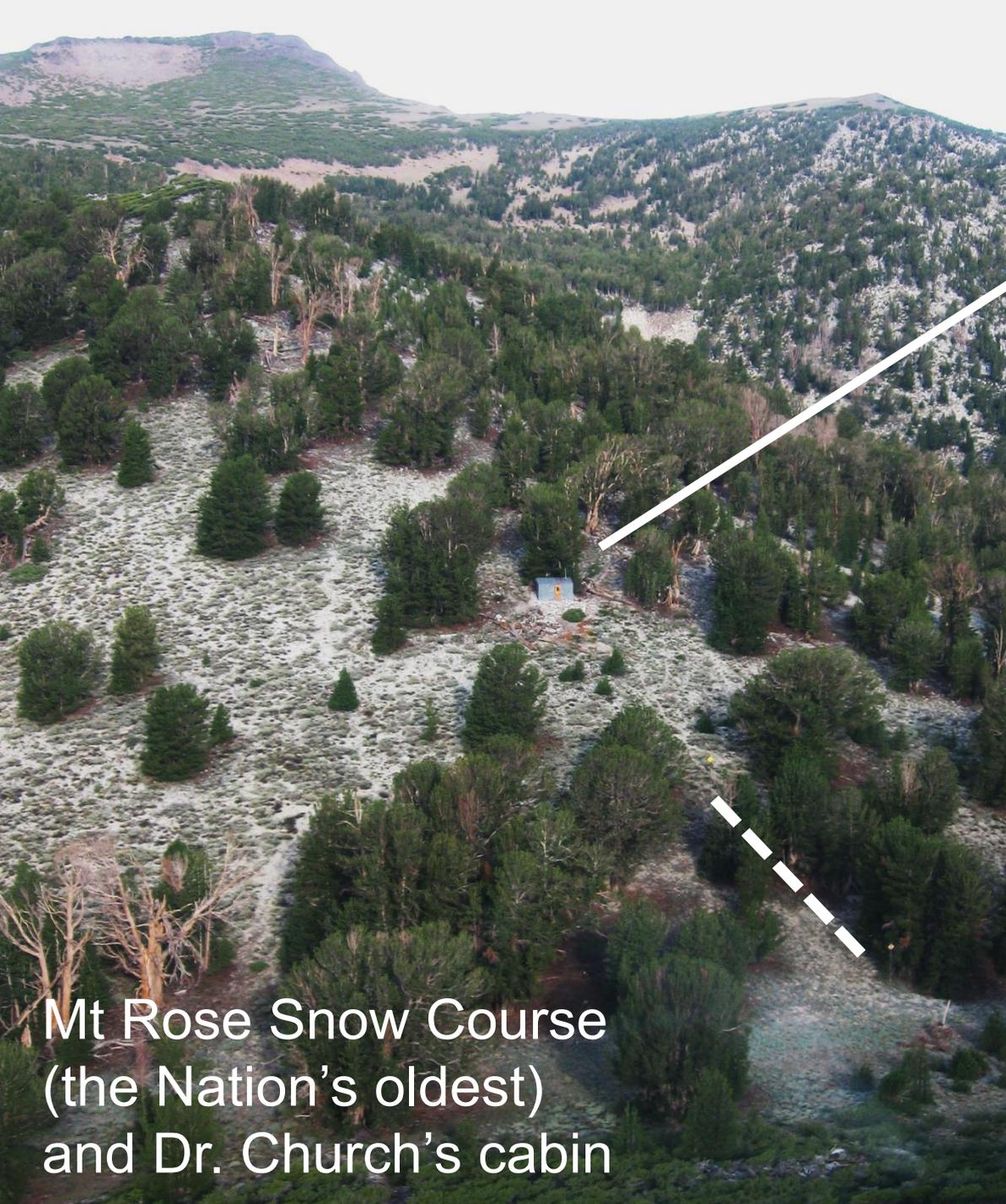
No. 2 of 2 sheets Comp. by _____ Checked by _____

Point 5:
255 in depth (21 ft)
124 in Snow SWE (10 ft of water)
9 sections of Tubes



Lake Lucille Snow Course, Lake Tahoe Basin, 8,188ft April 1 Snow Water Content for Years 1913-2016





Mt Rose Snow Course
(the Nation's oldest)
and Dr. Church's cabin



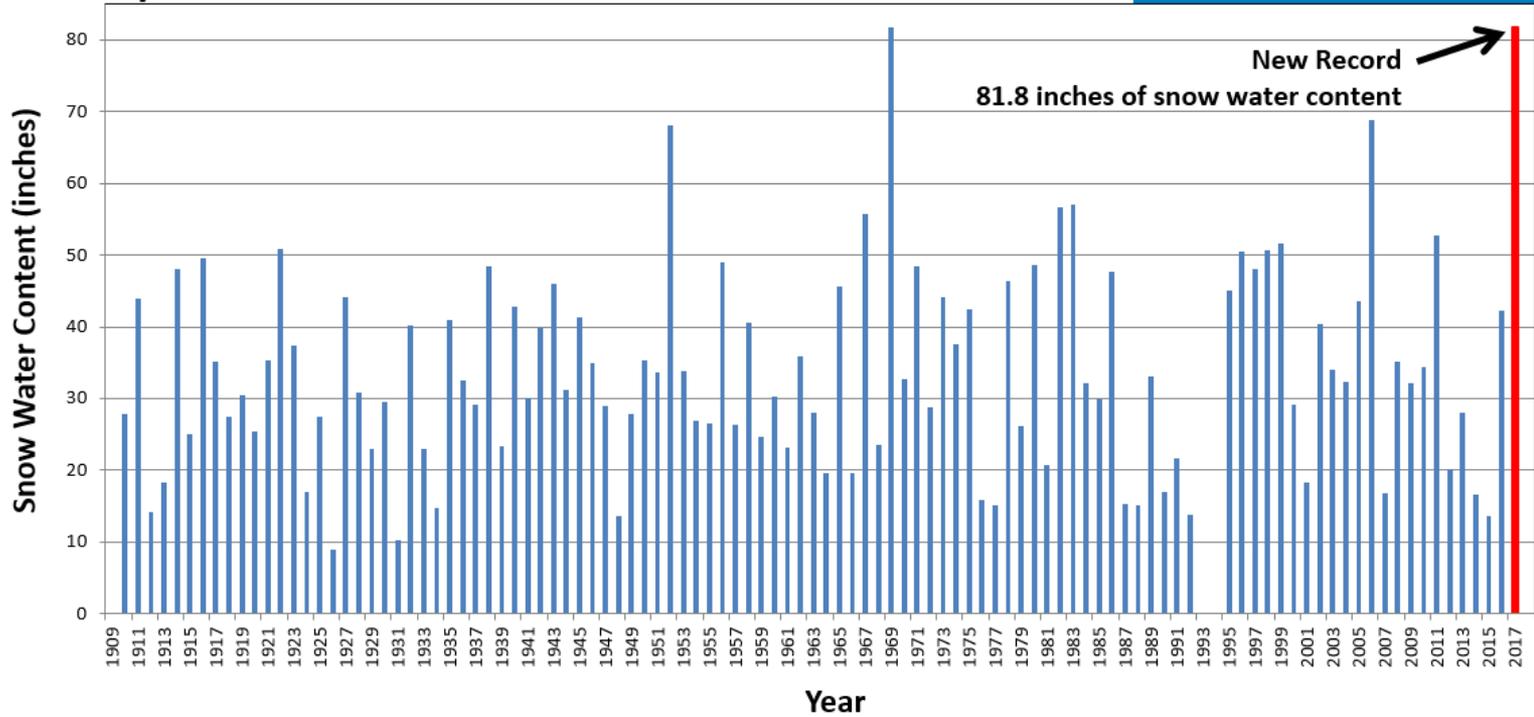
4/29/17



Mt. Rose Snow Course April 1 Data for Years 1910-2017

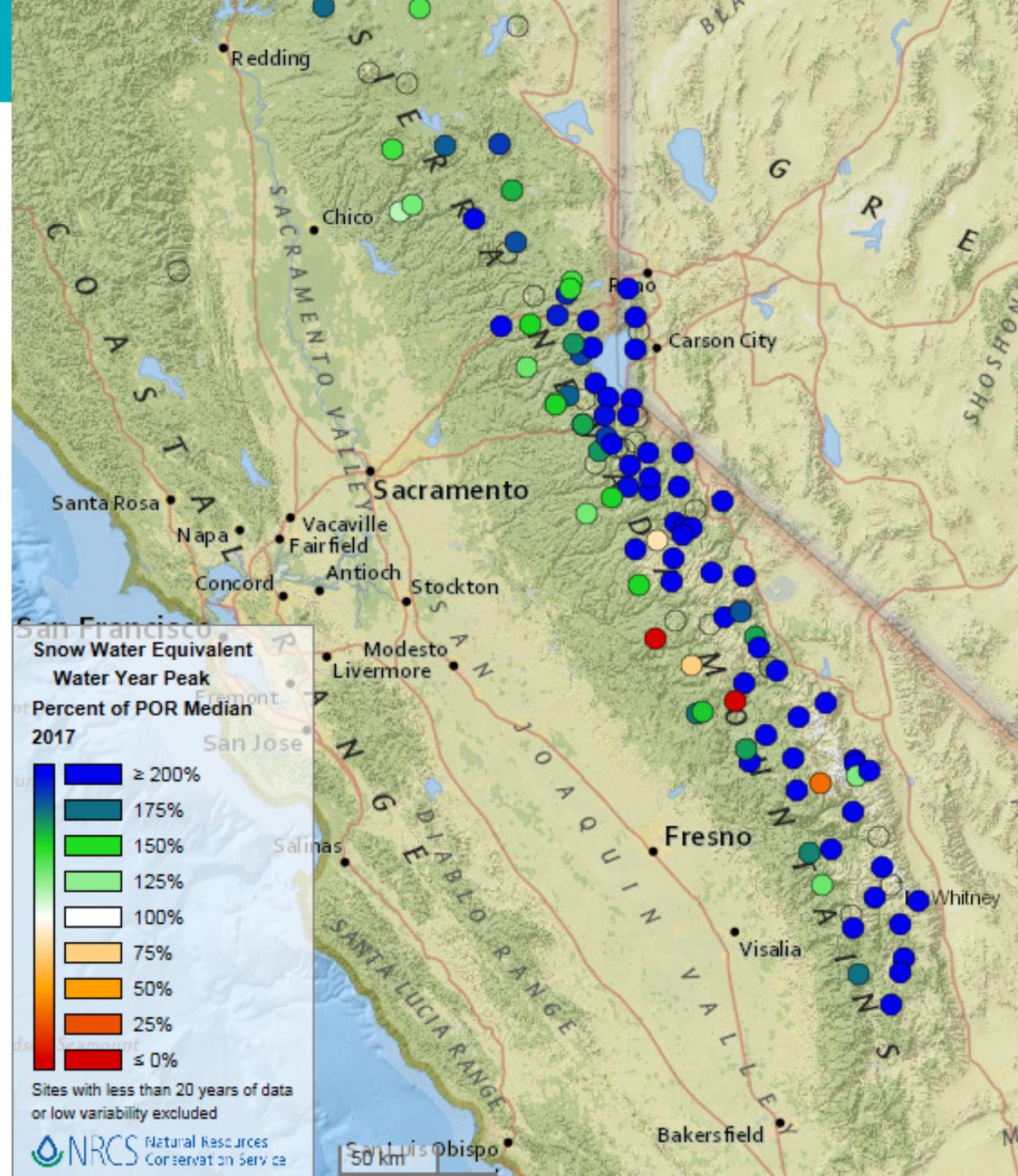


Photo Credit: UNR Archive



New Record

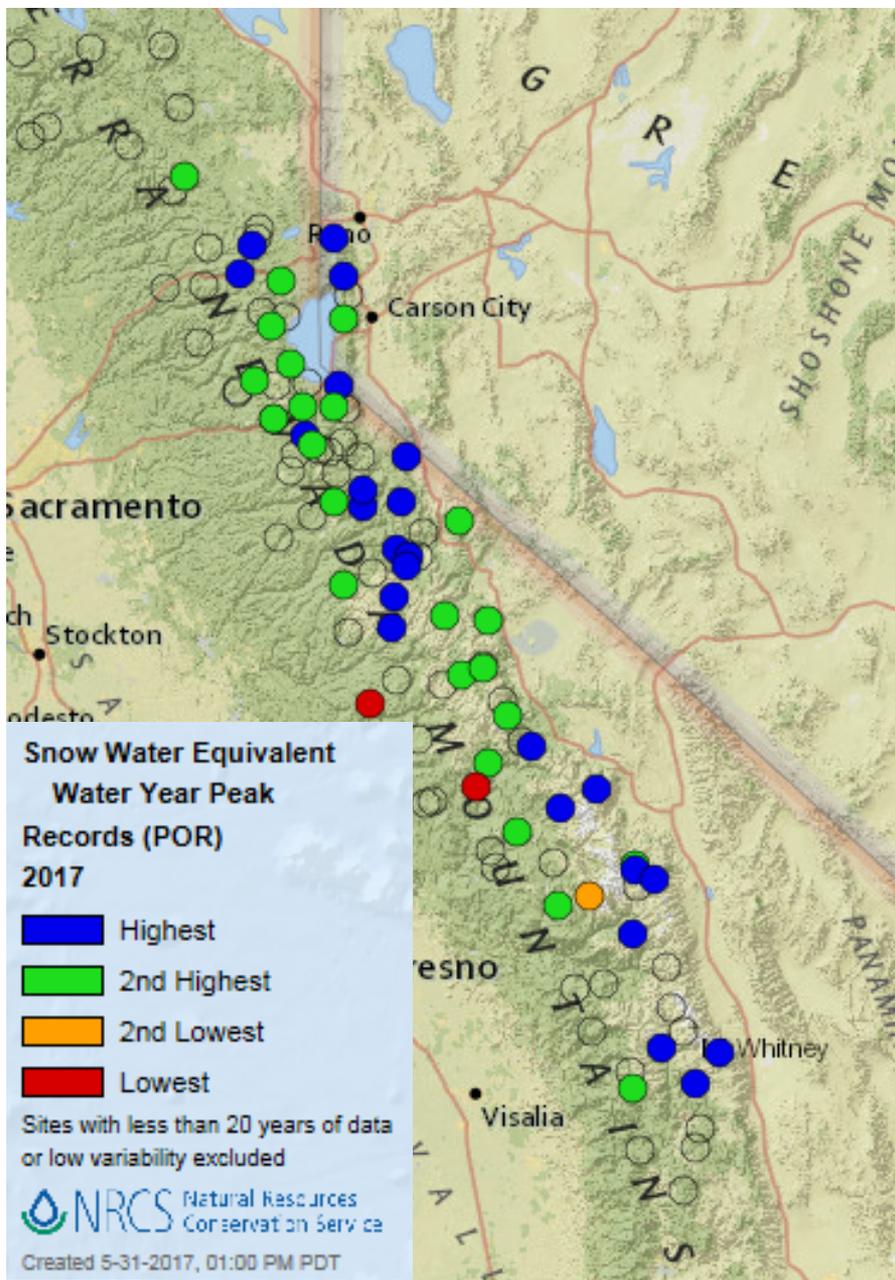
81.8 inches of snow water content



**Sierra-wide compared to
Period of Record**

**Most Sites <7500ft peaked
at
130-230% of median peak**

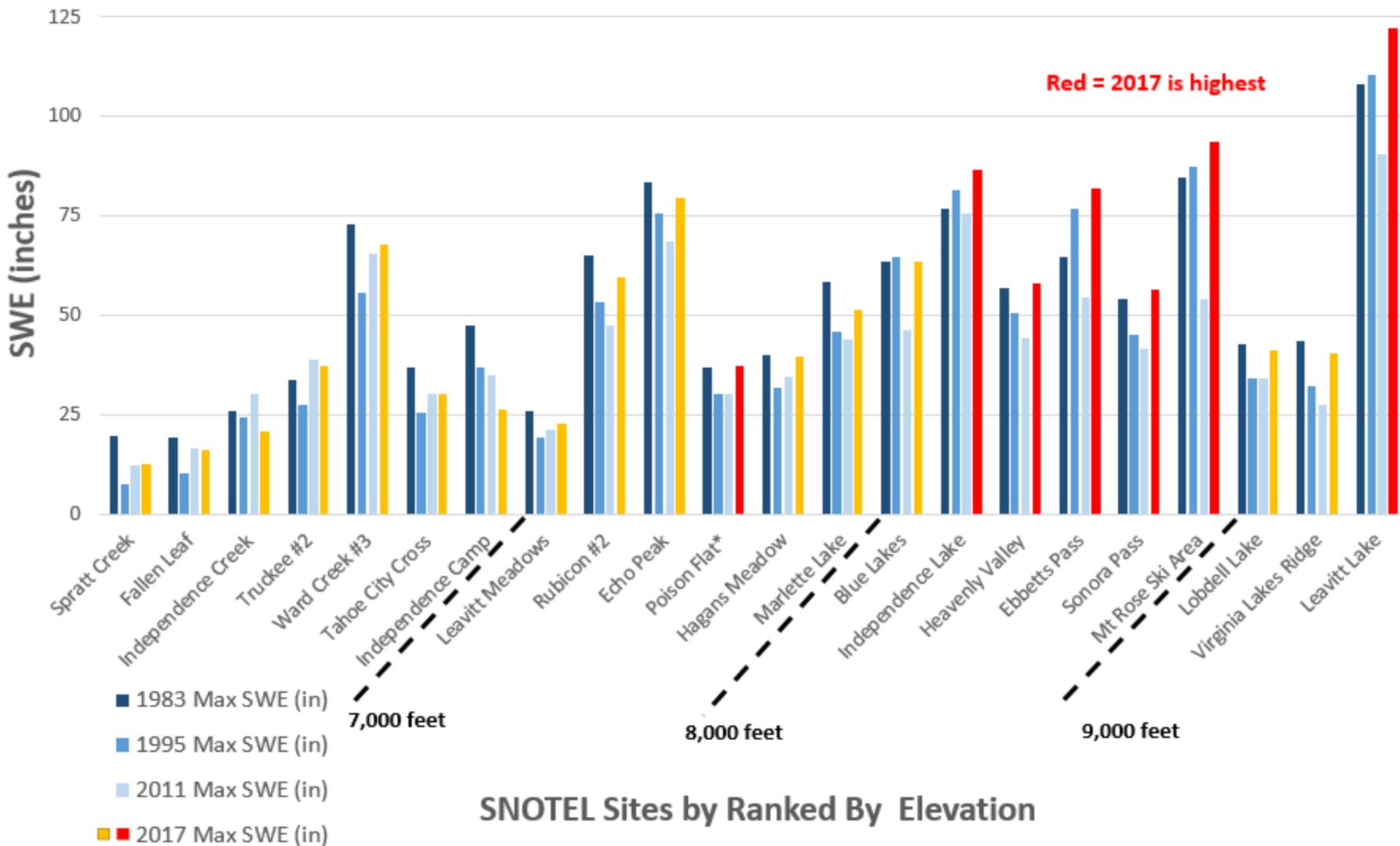
**Most Sites >7500ft peaked
at
210-350% of median peak**



**Sierra-wide
Peak SWE amounts were
Highest or 2nd Highest
at many NRCS & CA-DWR Stations**

Most stations peaked ~4/21

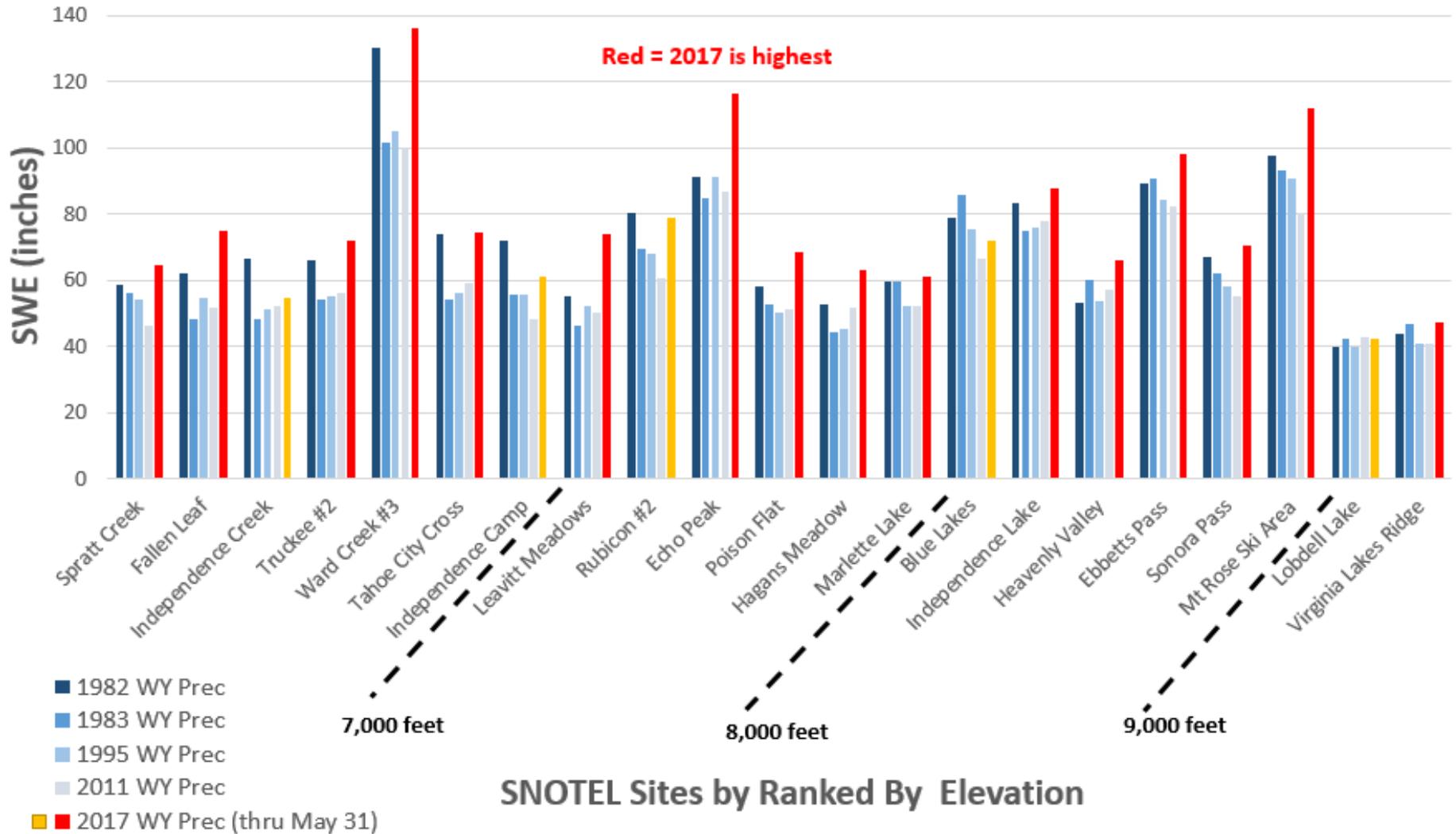
SNOTEL Water Year Max SWE for 1983, 1995, 2011 vs 2017



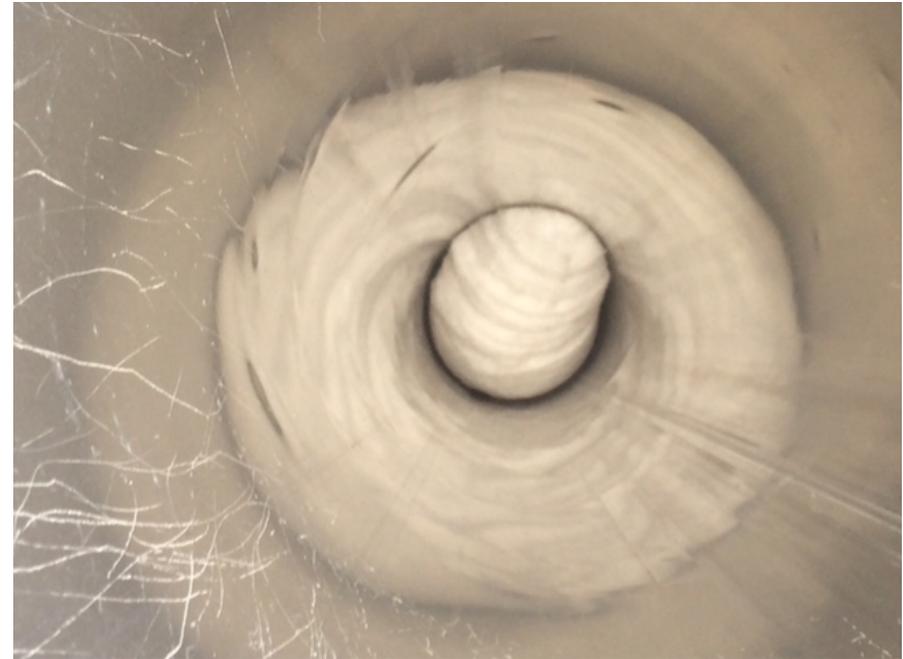
SNOTEL Sites by Ranked By Elevation



SNOTEL Water Year Precipitation 1982, 1983, 1995, 2011 vs 2017 (thru May 31)



SNOTEL Sites by Ranked By Elevation

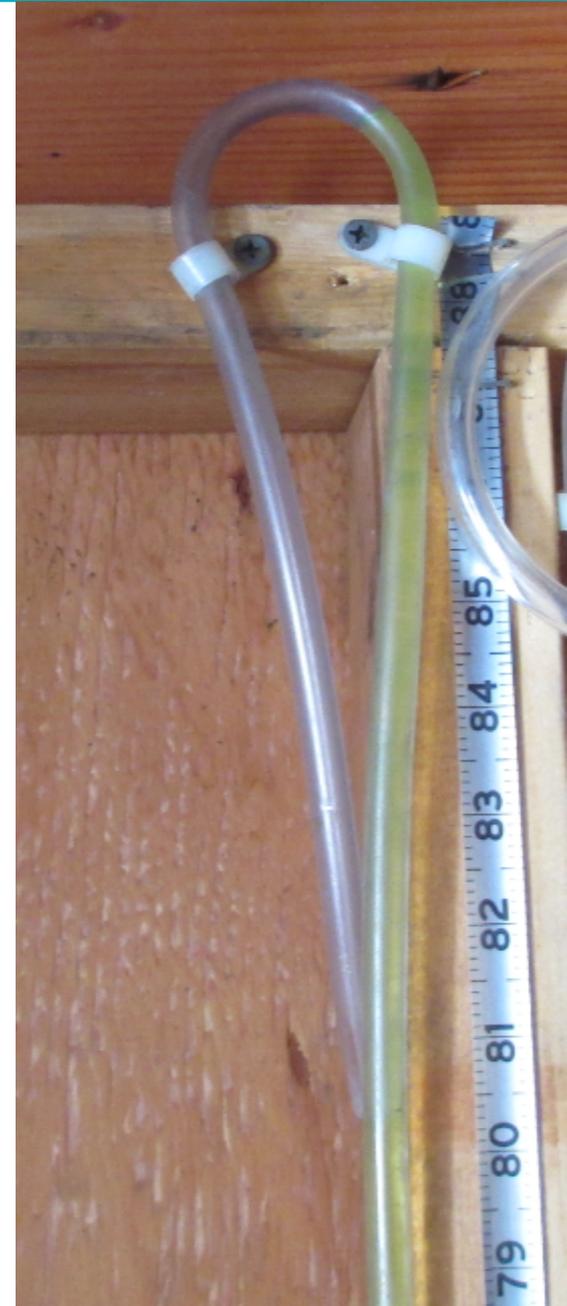


3/27/2017
Leavitt Lake SNOTEL
Precipitation Gage Snow Plug

Mixing in plug caused a rise of
 ~50in in reading

During winter of 2017
NRCS visited
22 of 32 SNOTELs
to address precipitation gage issues:

Gages Plugged with Snow
Overtopping Manometers
Maxed out Transducers



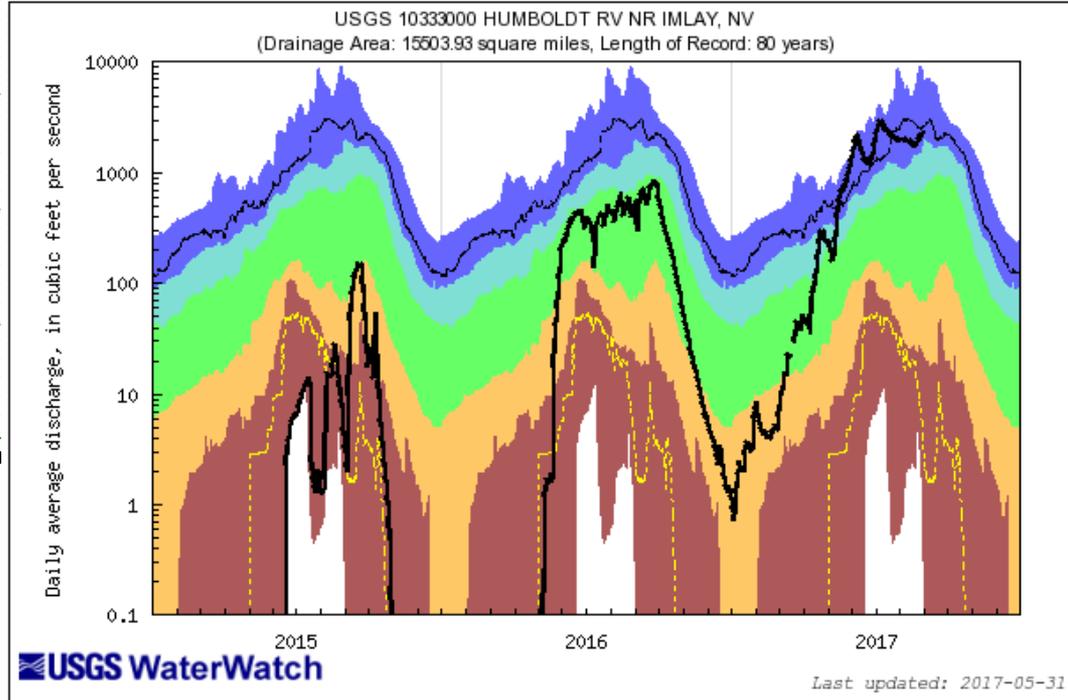
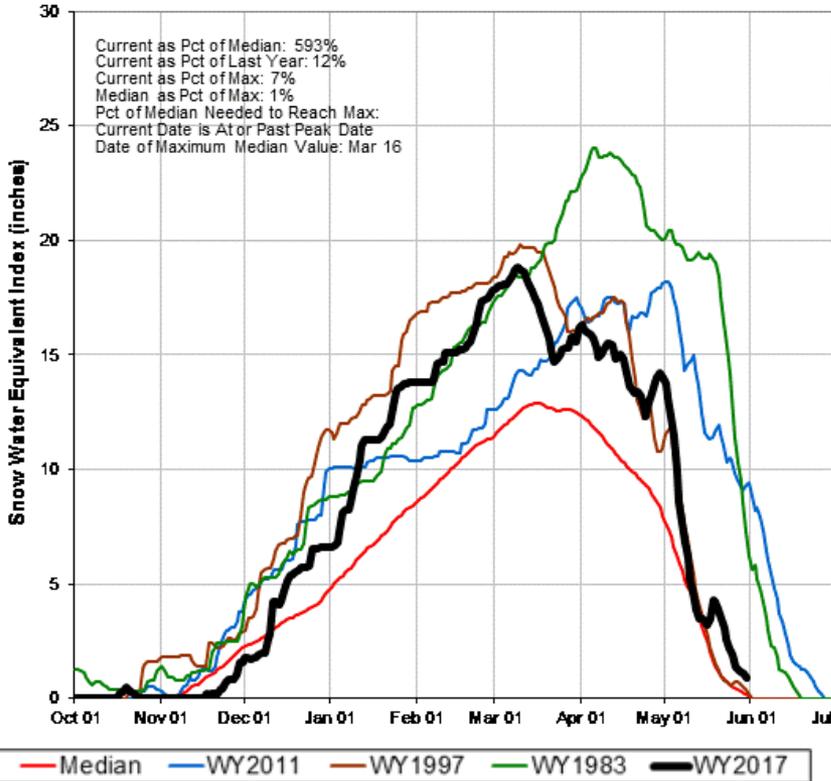
Still lots of snow to melt in High Country



UPPER HUMBOLDT RIVER BASIN Time Series Snowpack Summary
Based on Provisional SNOTEL data as of May 30, 2017



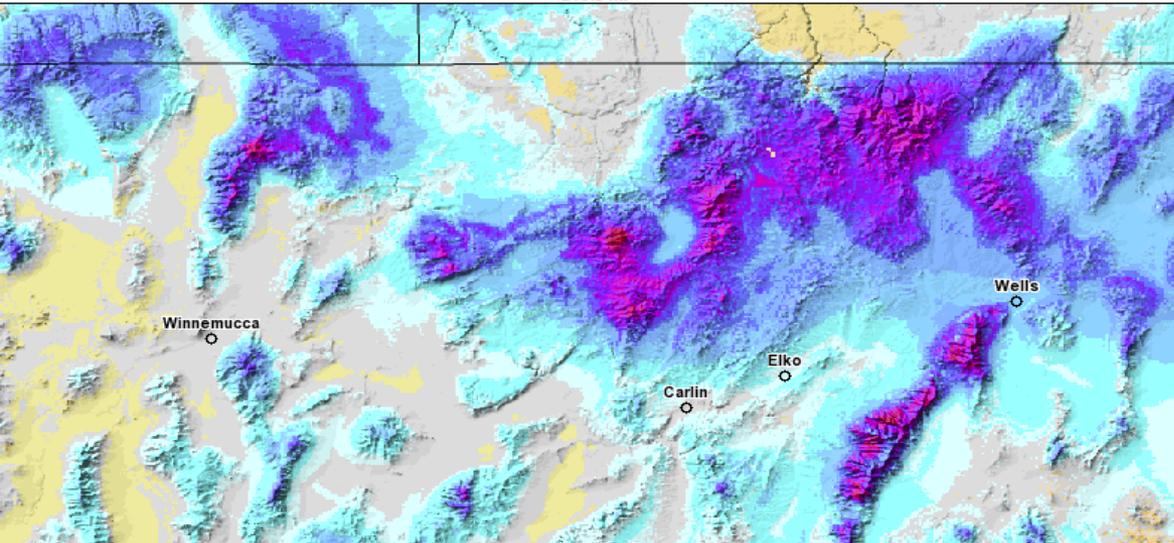
Current as Pct of Median: 593%
 Current as Pct of Last Year: 12%
 Current as Pct of Max: 7%
 Median as Pct of Max: 1%
 Pct of Median Needed to Reach Max:
 Current Date is At or Past Peak Date
 Date of Maximum Median Value: Mar 16



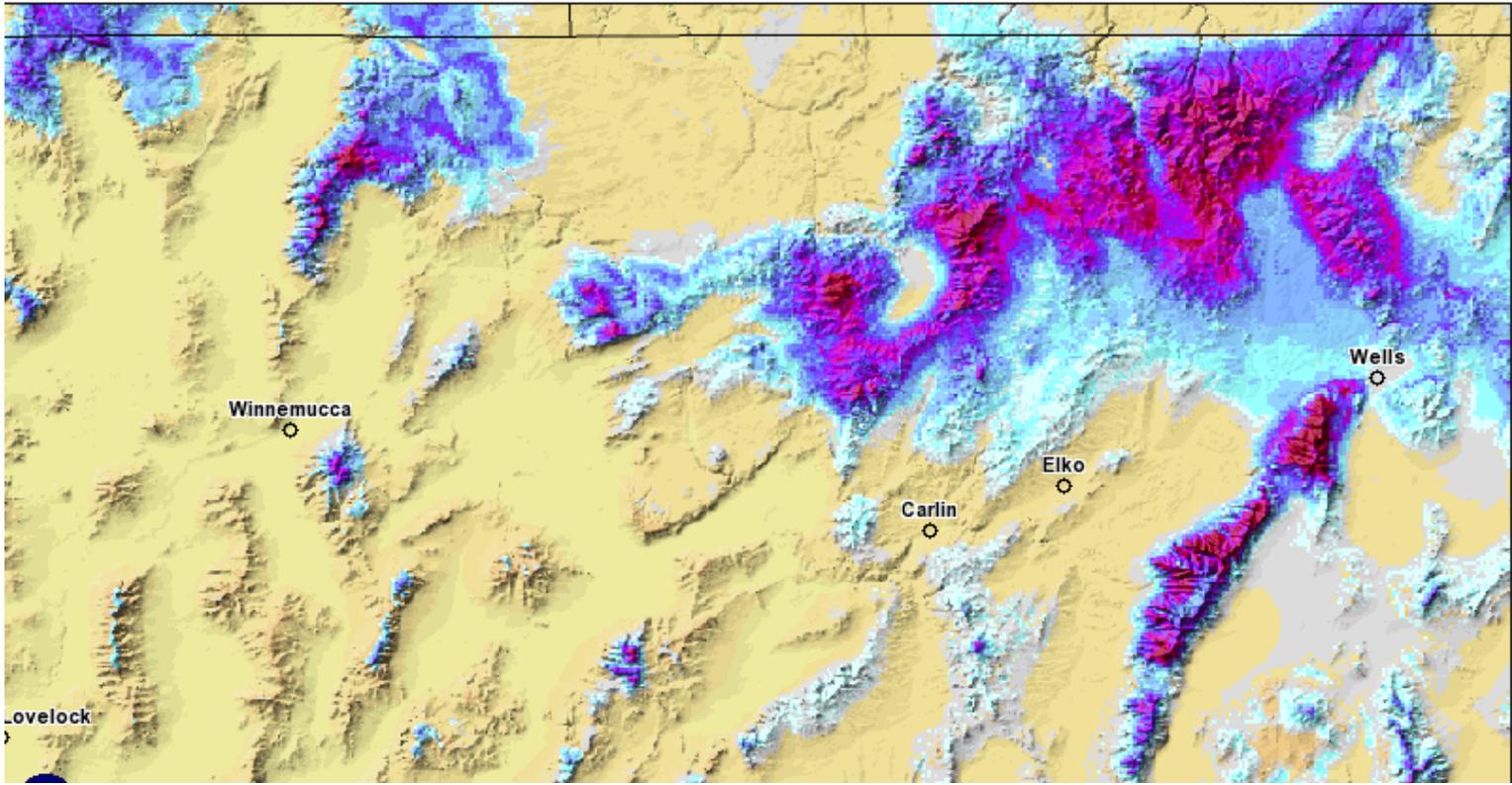
Explanation - Percentile classes

lowest-10th percentile	5	10-24	25-75	76-90	95	90th percentile-highest	Flow
Much below Normal		Below normal	Normal	Above normal	Much above normal		

Modeled Snow Water Equivalent for 2017 February 1, 6:00 UTC
210.8 mi



Modeled Snow Water Equivalent for 2017 February 16, 6:00 UTC
198.0 mi



Inches of water equivalent

Dark Red	> 30
Red	20 to 30
Dark Purple	18 to 20
Purple	16 to 18
Light Purple	14 to 16
Blue-Gray	12 to 14
Blue	10 to 12
Light Blue	8 to 10
Cyan	6 to 8
Light Cyan	4 to 6
Light Green	2 to 4
Yellow	1 to 2
White	trace to 1
White box	Not Estimated

Key Points:

- **Historic snow accumulation during January-February 2017**
- **2017 ranks among the biggest snow years in the Sierra, especially >8,000ft.**
- **2017 is already breaking water year precipitation records. With colder temperatures during October, January and February AR events snow accumulation during the winter of 2017 could have been significantly more.**
- **2015 and 2017 are bookends emphasizing the range of “normal” climate.**

