



United States Department of Agriculture



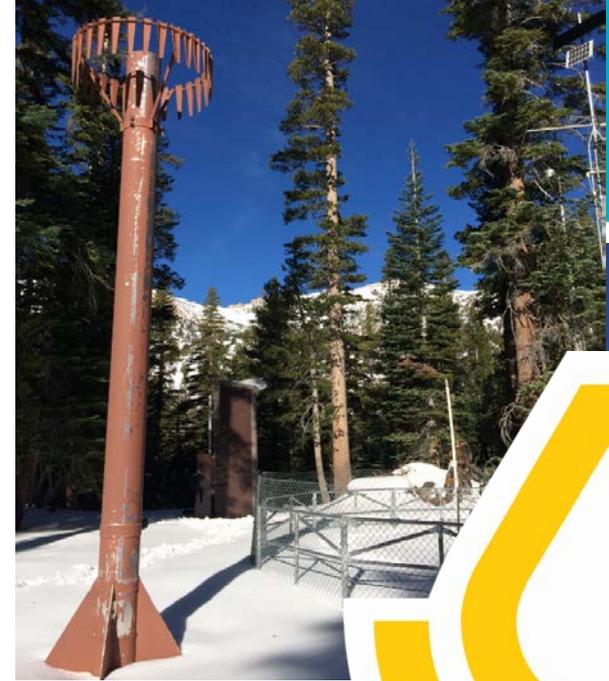
2017 Snowpack Status and Streamflow Outlook for the Truckee, Carson, Walker and Humboldt Basins

February 10, 2017
Nevada Division of Water Resources

Buried Chairlift at Kirkwood Ski Resort, Jan 2017

Jeff Anderson
Nevada NRCSSnow Survey

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



Natural Resources Conservation Service

www.nv.nrcs.usda.gov/snow

Outline

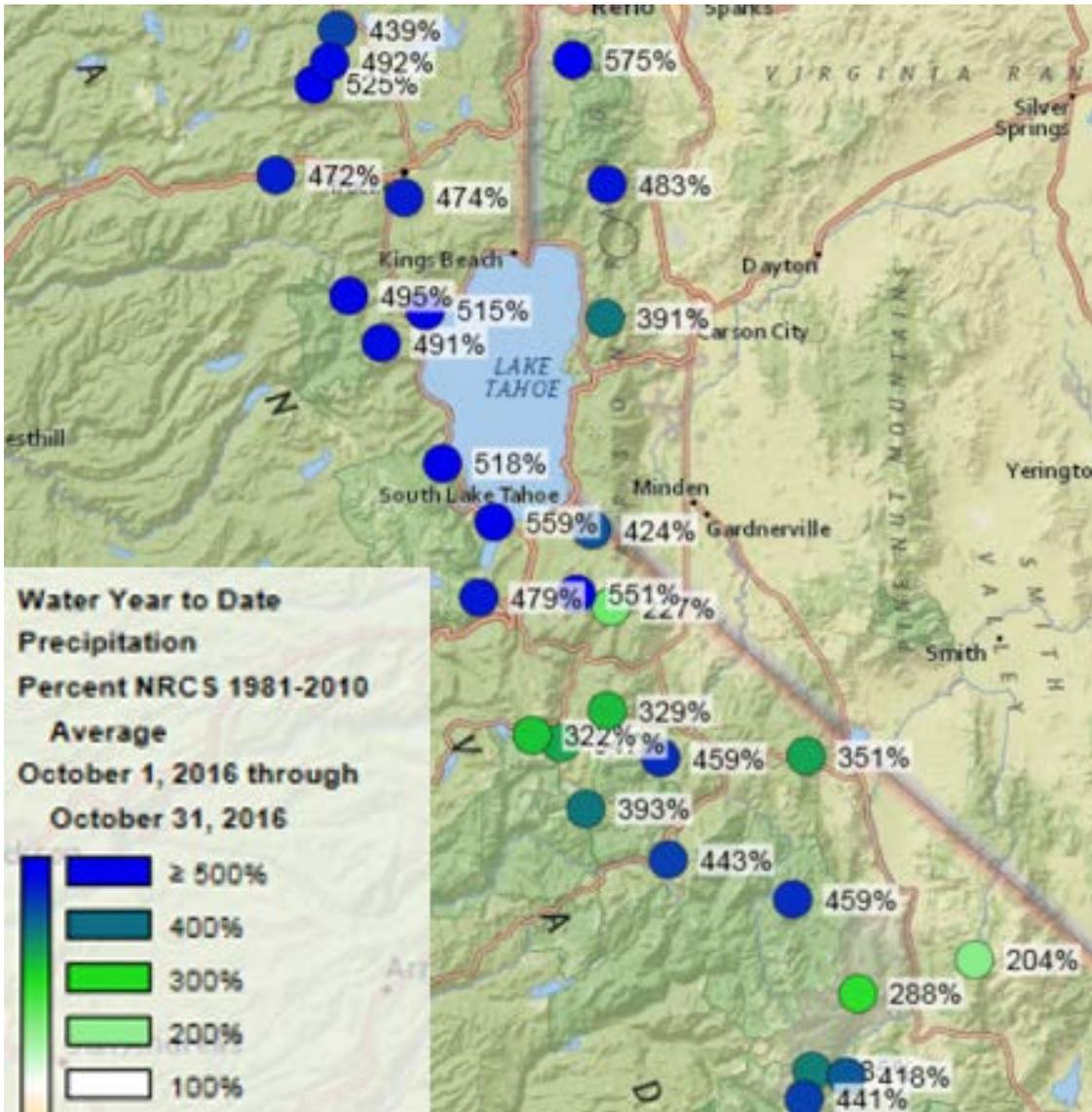
- **Snowpack and Precipitation update**
- **Drought Status Update**
- **Current Streamflow Status**
- **Summer Streamflow Forecasts**
- **Soil Moisture status**
- **February Month to Date**
- **Future Weather and Climate Outlook**
- **Review of 2016 Streamflow forecasts**
- **Key Take Home Points**

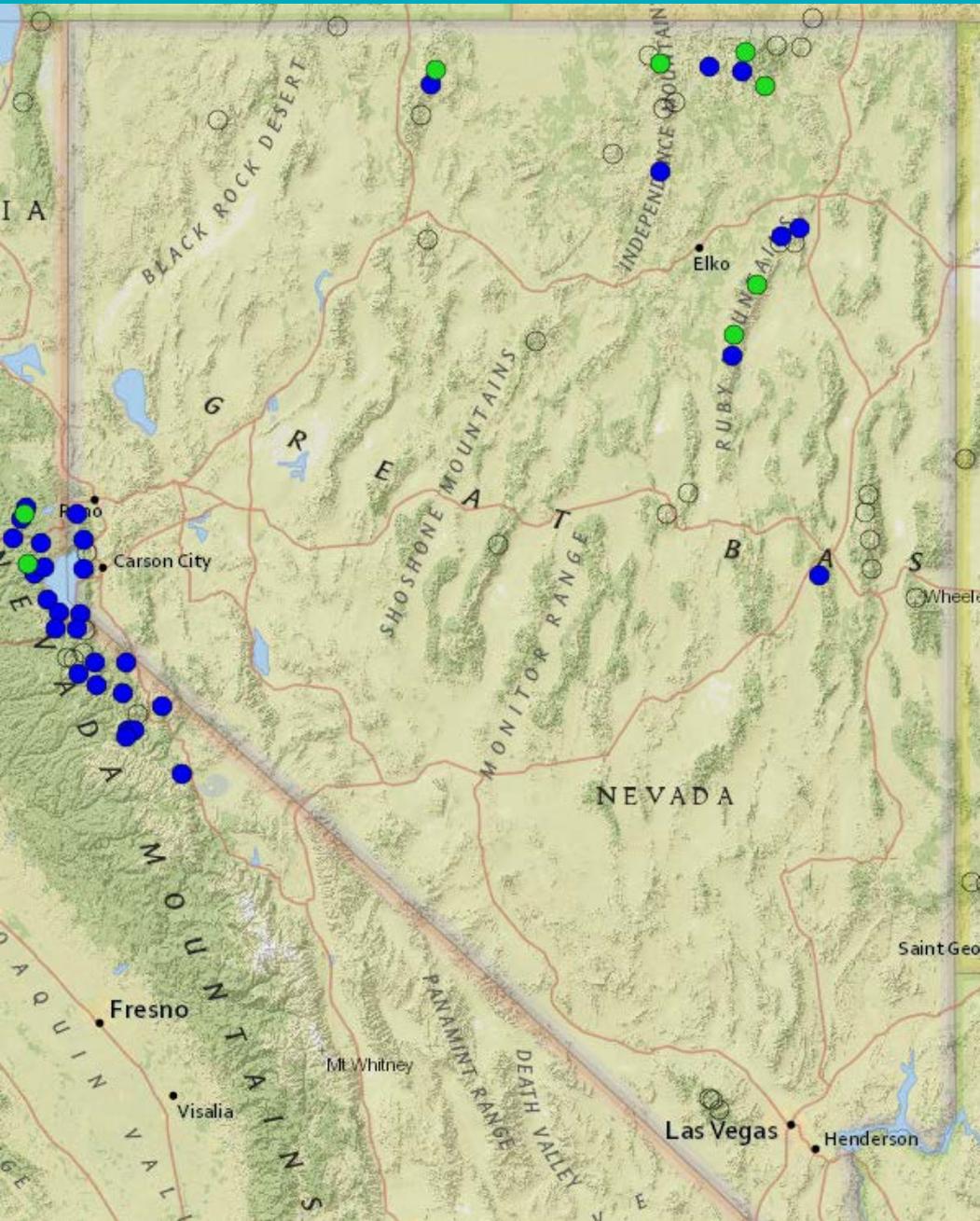


Record October

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

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





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

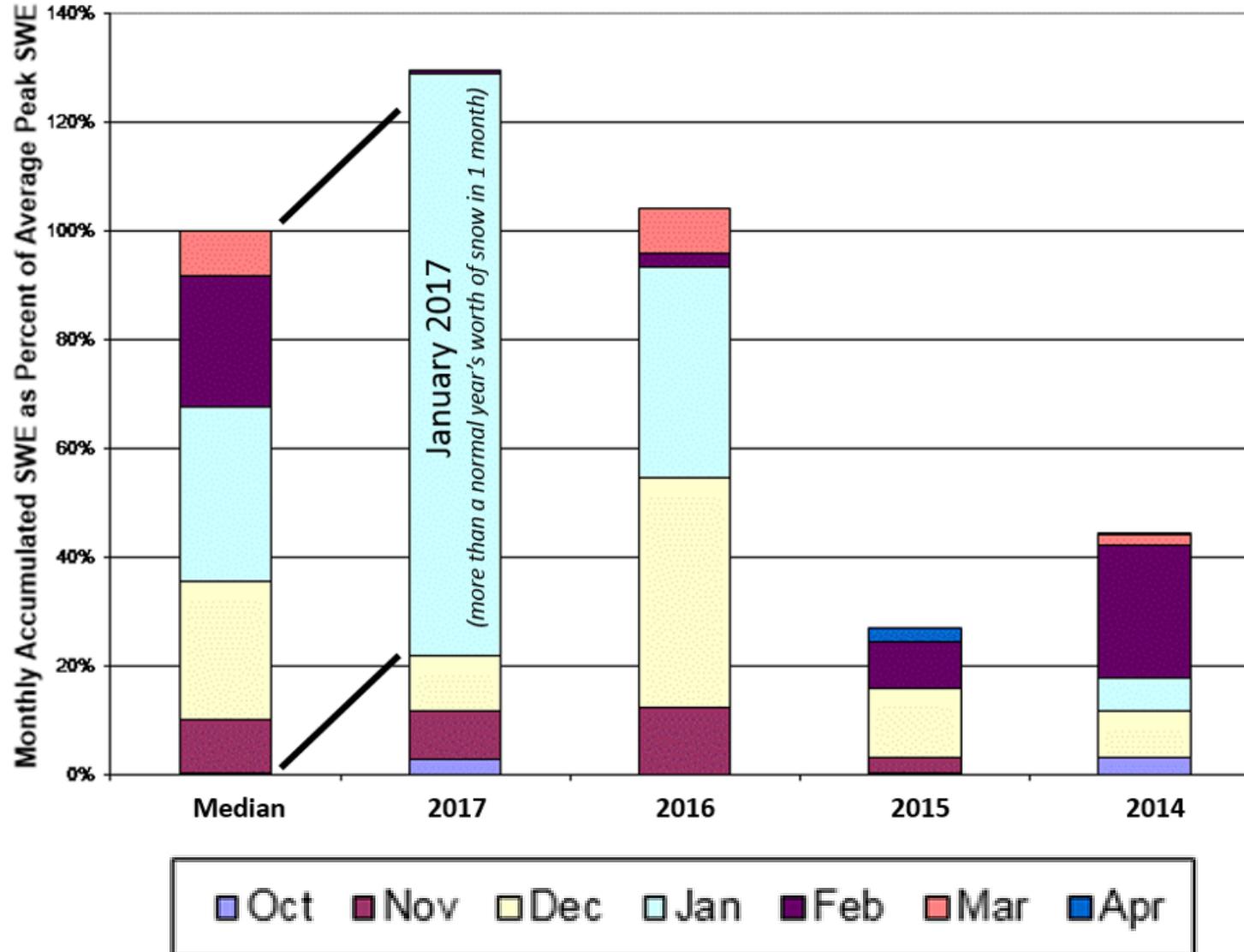
Sites with less than 20 years of data
or low variability excluded

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



Lake Tahoe Basin Time Series Monthly Snowpack Summary

Based on Provisional SNOTEL data as of Feb 1, 2017



#Januburied

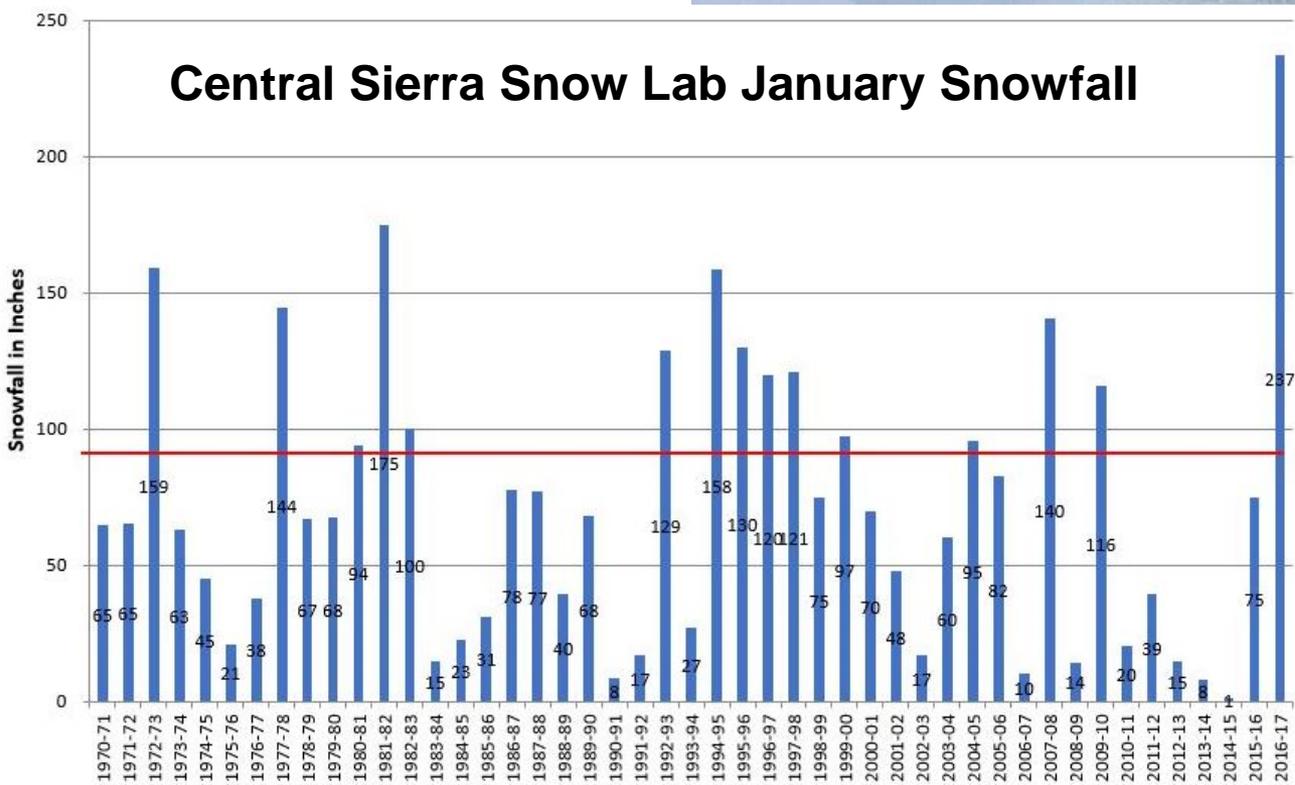
Mt Rose Ski Tahoe
295 inches of snowfall
January 2017, new record



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

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

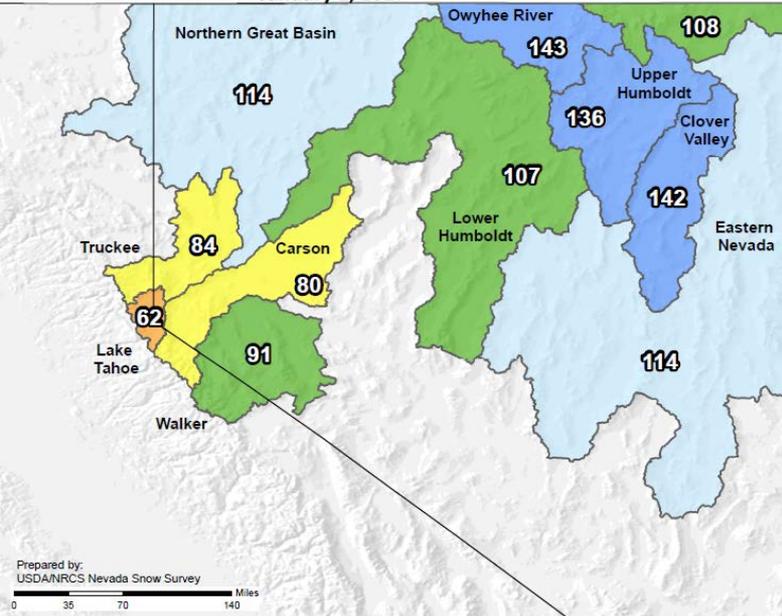
Central Sierra Snow Lab January Snowfall



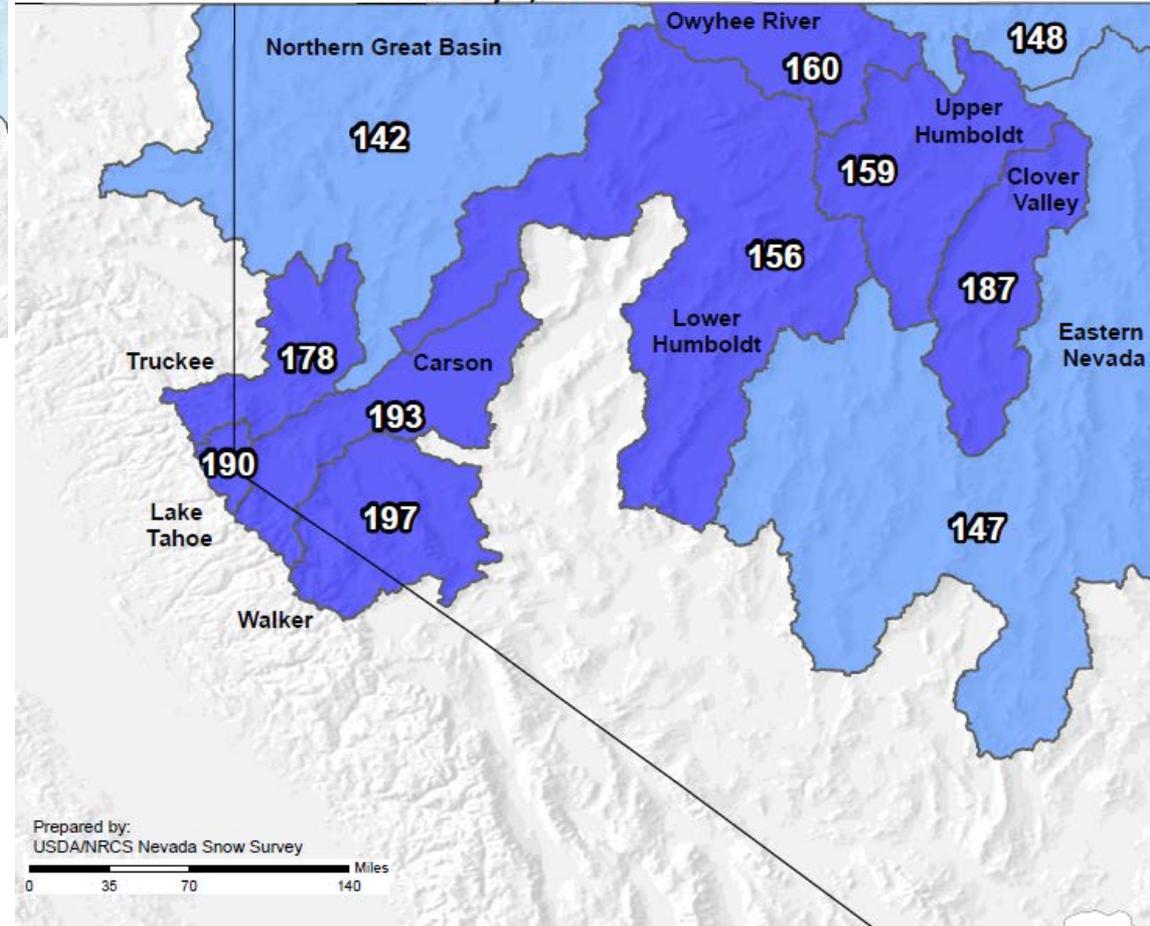
CSS Lab snowfall
Jan 2017 = 237inches
Old record
Jan 1982 = 175inches

Beat all time monthly record Mar 1992 = 201in

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



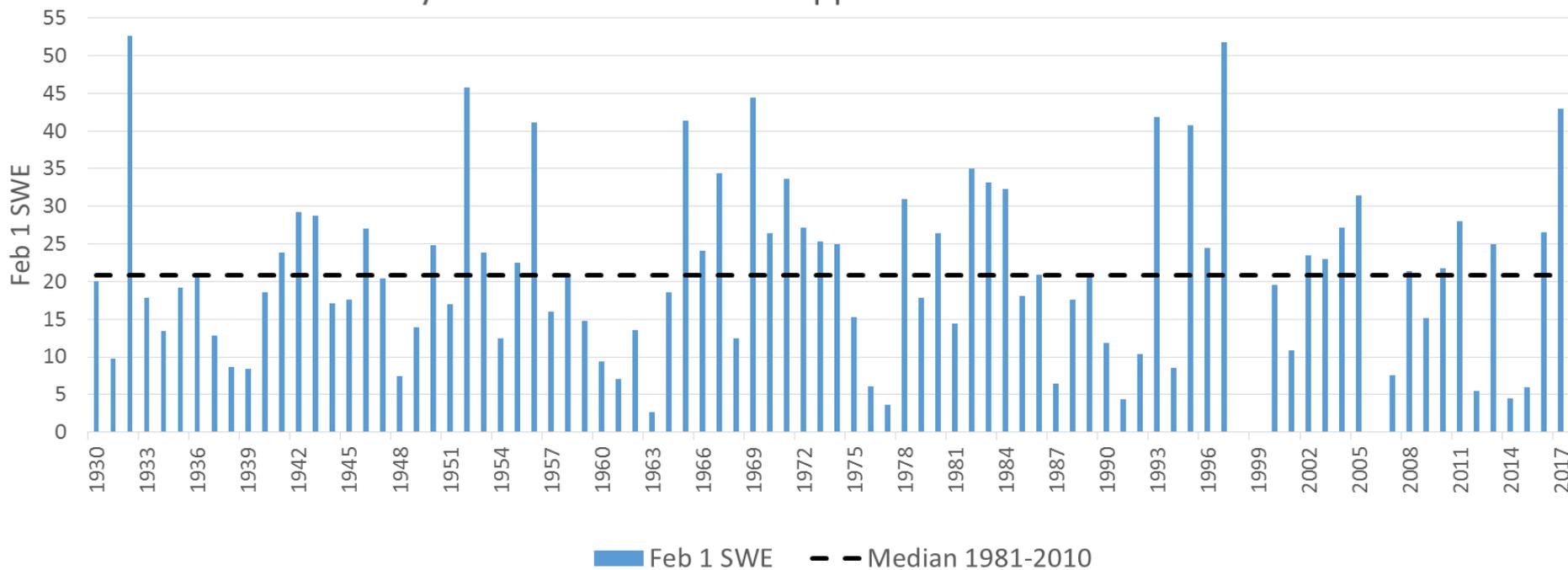
Nevada & Eastern Sierra
Percent of Median Snowpack
February 1, 2017



% Increase

- Tahoe +128% (tripled)
- Truckee +94% (doubled)
- Cason +113% (doubled)
- Walker +106% (doubled)
- Lower Humboldt +49%
- Upper Humboldt +23%

February 1 SWE at Carson Pass Upper Snow Course 1930-2017

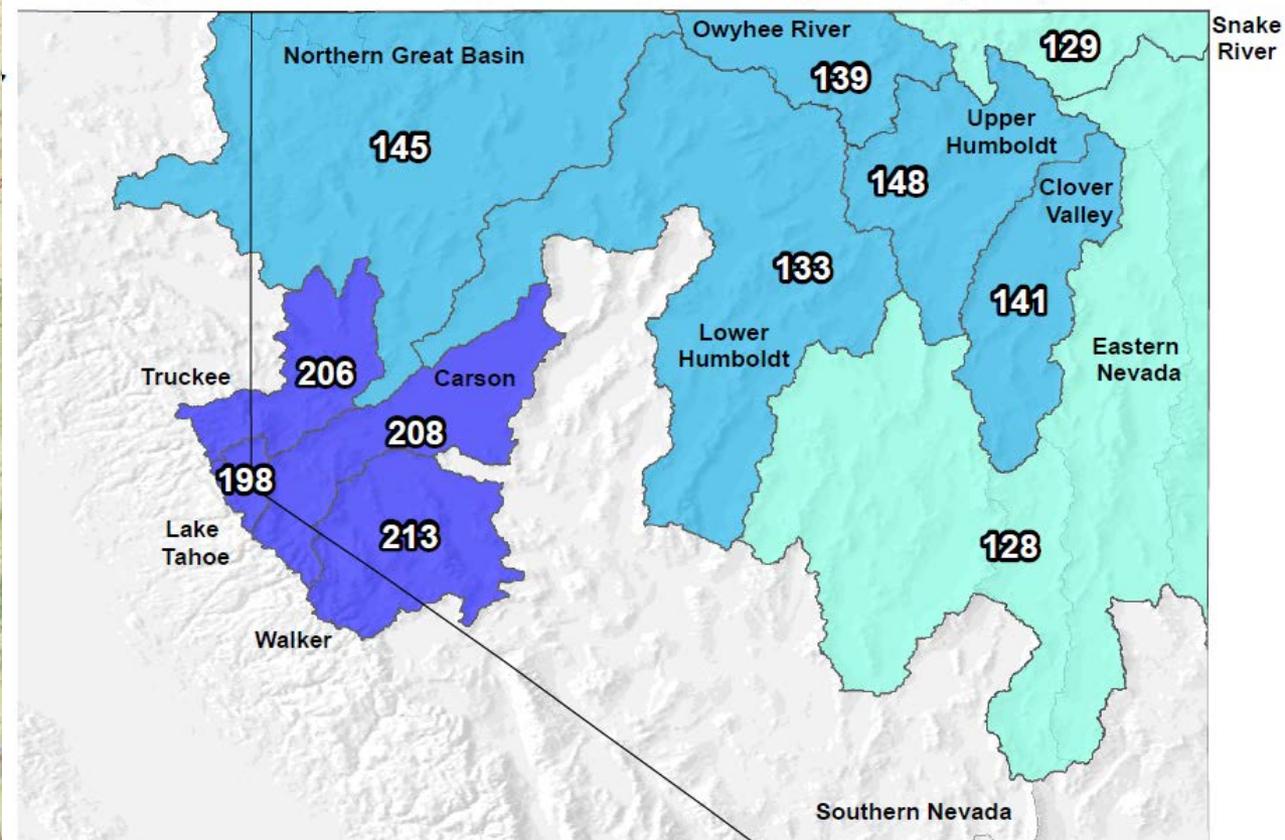
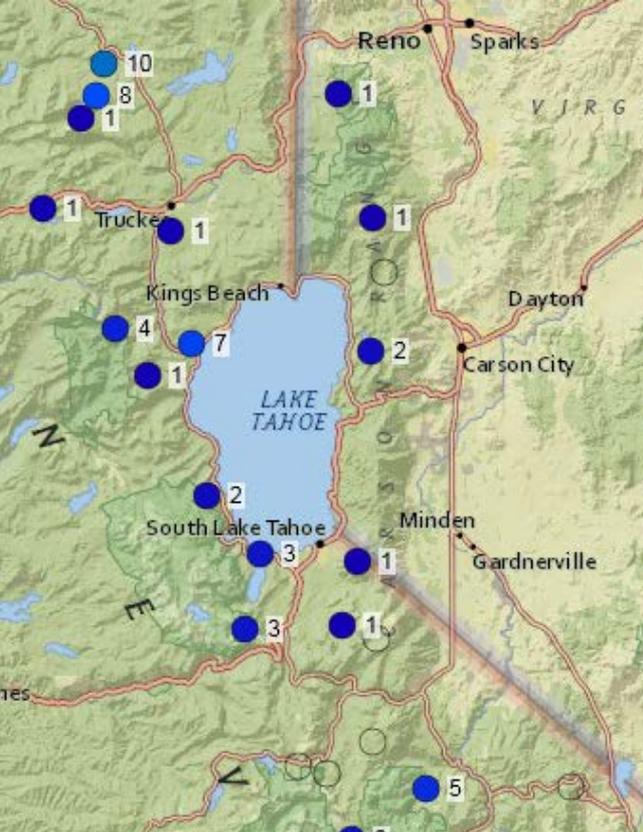


5th highest since 1930

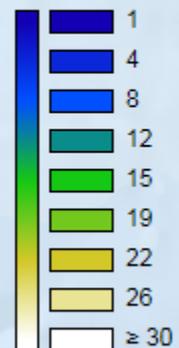
Year	SWE
1932	52.6
1997	51.8
1952	45.8
1969	44.4
2017	43



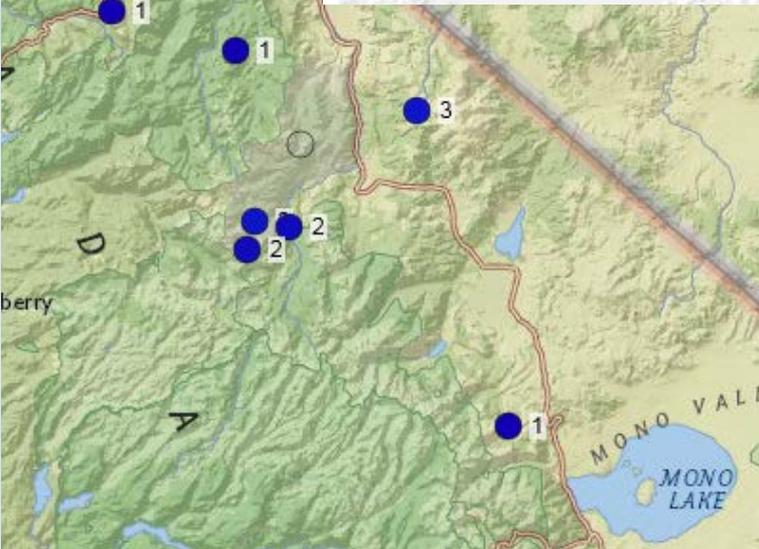
Nevada/California SNOTEL Current Snow Water Equivalent (SWE) % of Normal



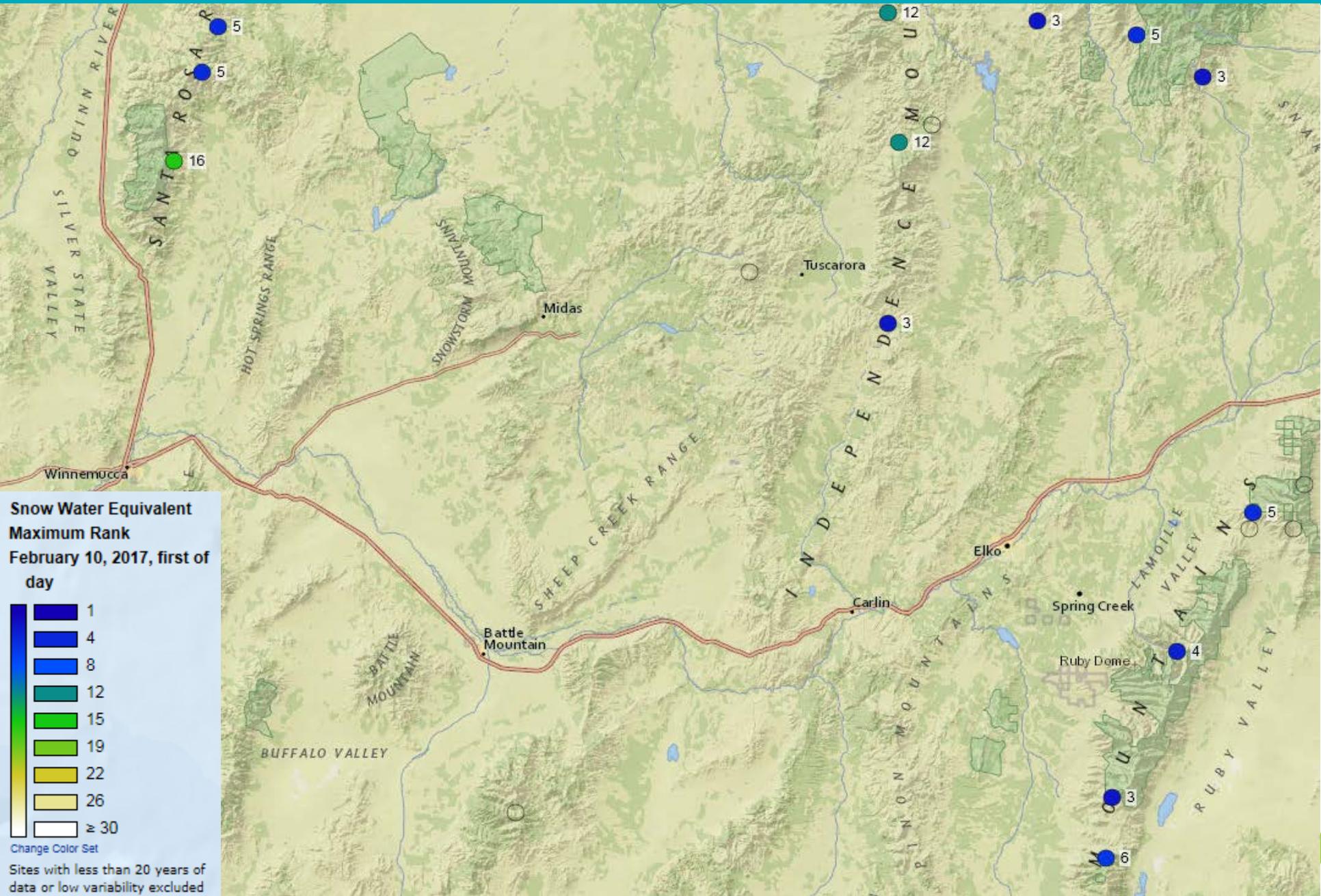
Snow Water Equivalent
Maximum Rank
February 10, 2017, first of
day



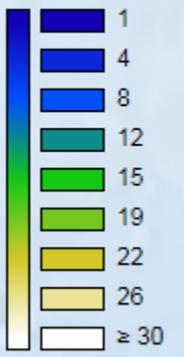
Change Color Set
Sites with less than 20 years of
data or low variability excluded



February 10, 2017 Snowpack



**Snow Water Equivalent
Maximum Rank
February 10, 2017, first of
day**



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

Lake Tahoe Basin - SWE Index



Created: February 09, 2017

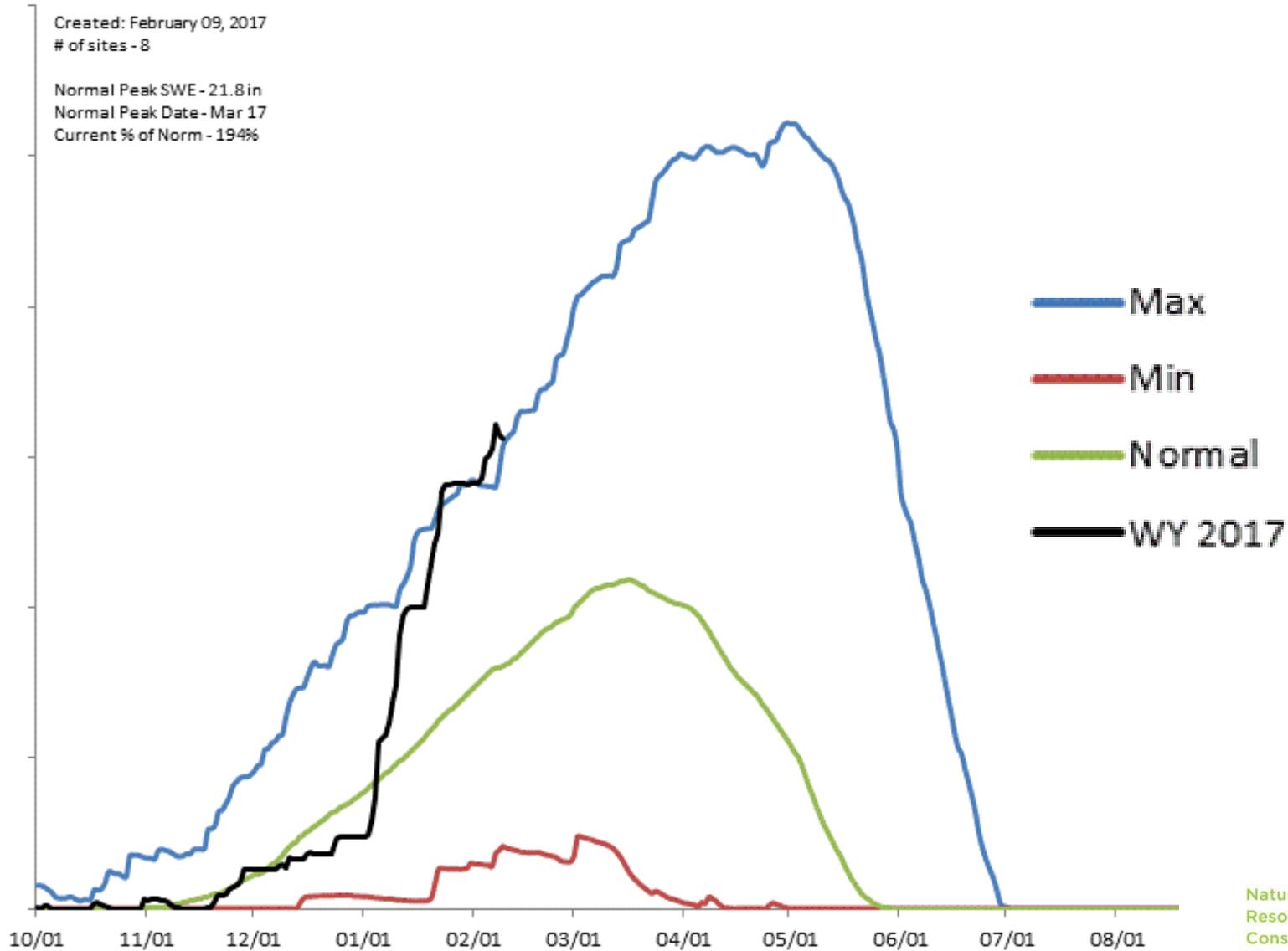
of sites - 8

Normal Peak SWE - 21.8 in

Normal Peak Date - Mar 17

Current % of Norm - 194%

Index of Snow Water Equivalent

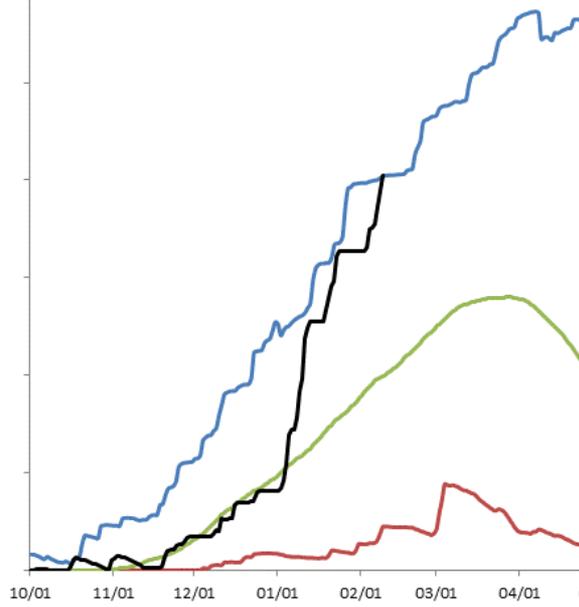


Truckee River Basin - SWE Index



Created: February 09, 2017
 # of sites - 8
 Normal Peak SWE - 28.012 in
 Normal Peak Date - Mar 29
 Current % of Norm - 203%

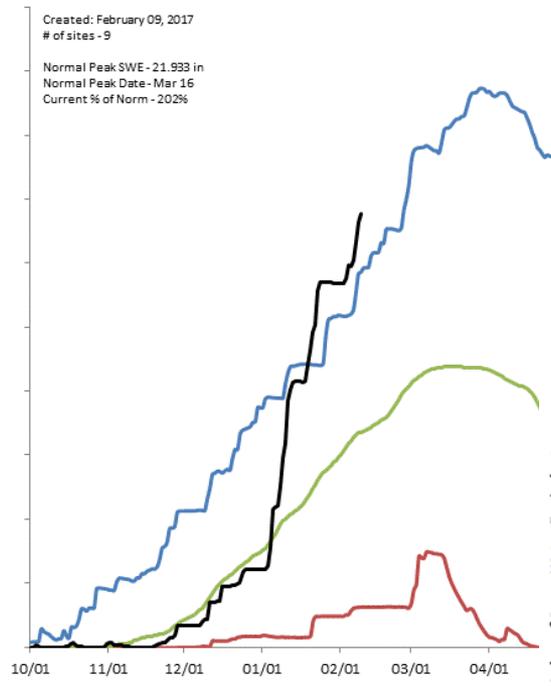
Feb 2017 will set new basin SWE maximums



Carson River Basin - SWE Index



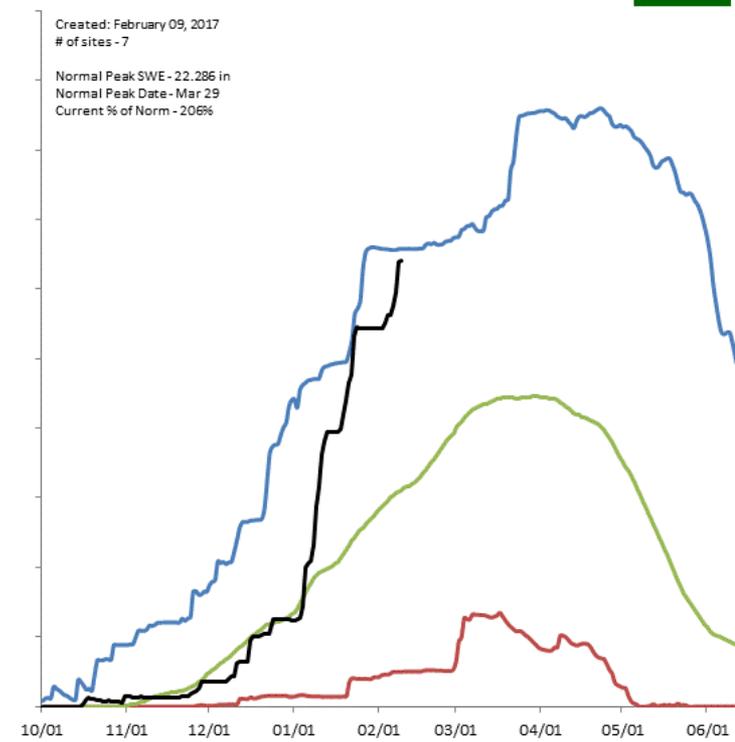
Created: February 09, 2017
 # of sites - 9
 Normal Peak SWE - 21.933 in
 Normal Peak Date - Mar 16
 Current % of Norm - 202%



Walker River Basin - SWE Index



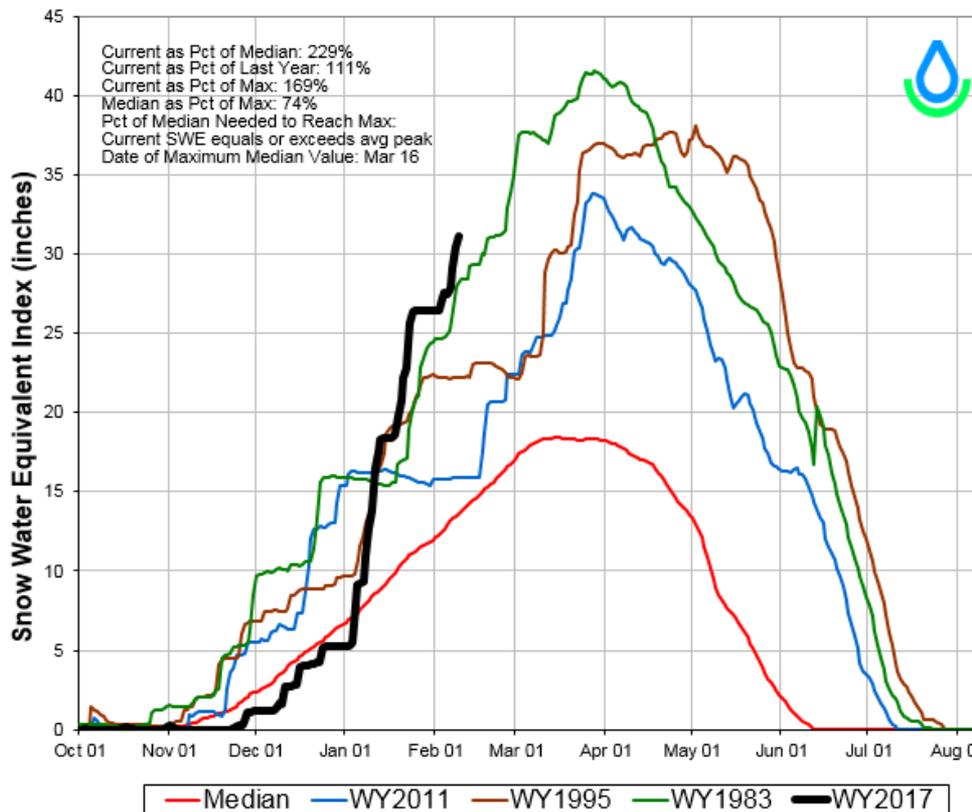
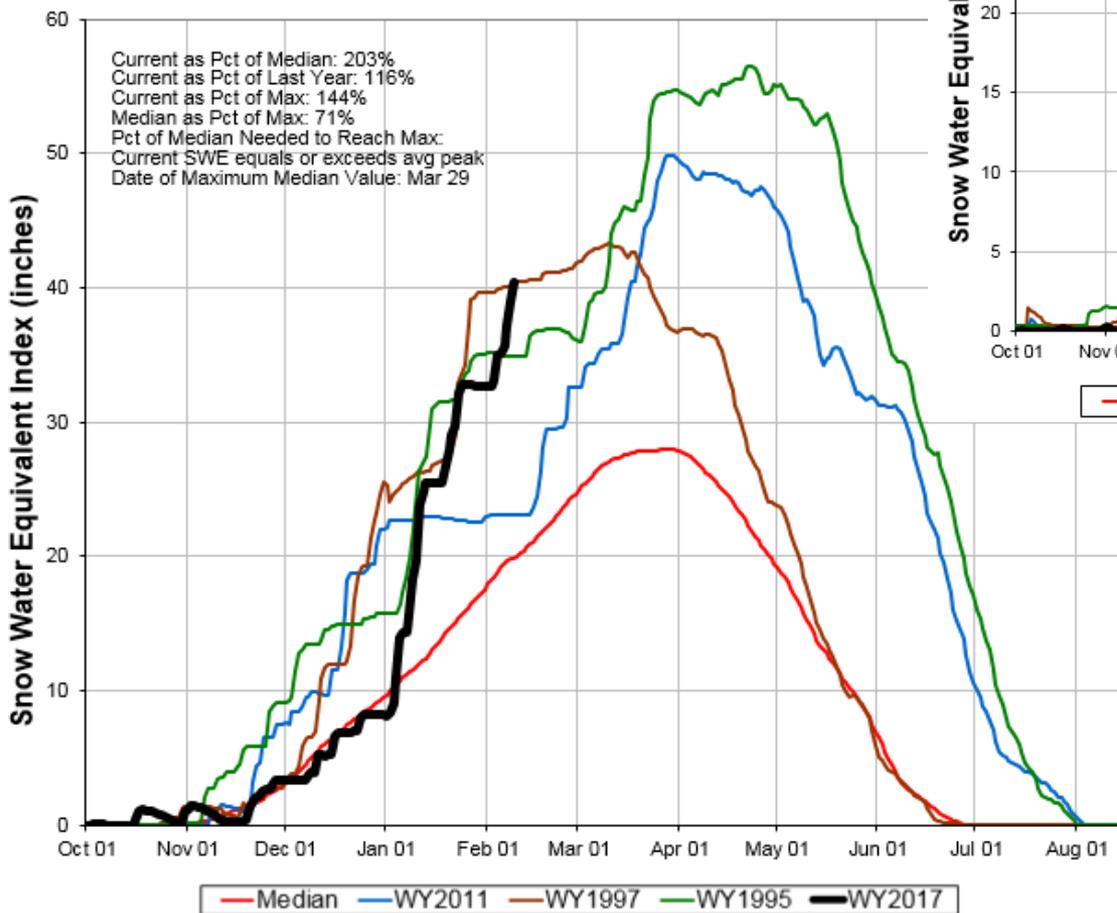
Created: February 09, 2017
 # of sites - 7
 Normal Peak SWE - 22.286 in
 Normal Peak Date - Mar 29
 Current % of Norm - 206%



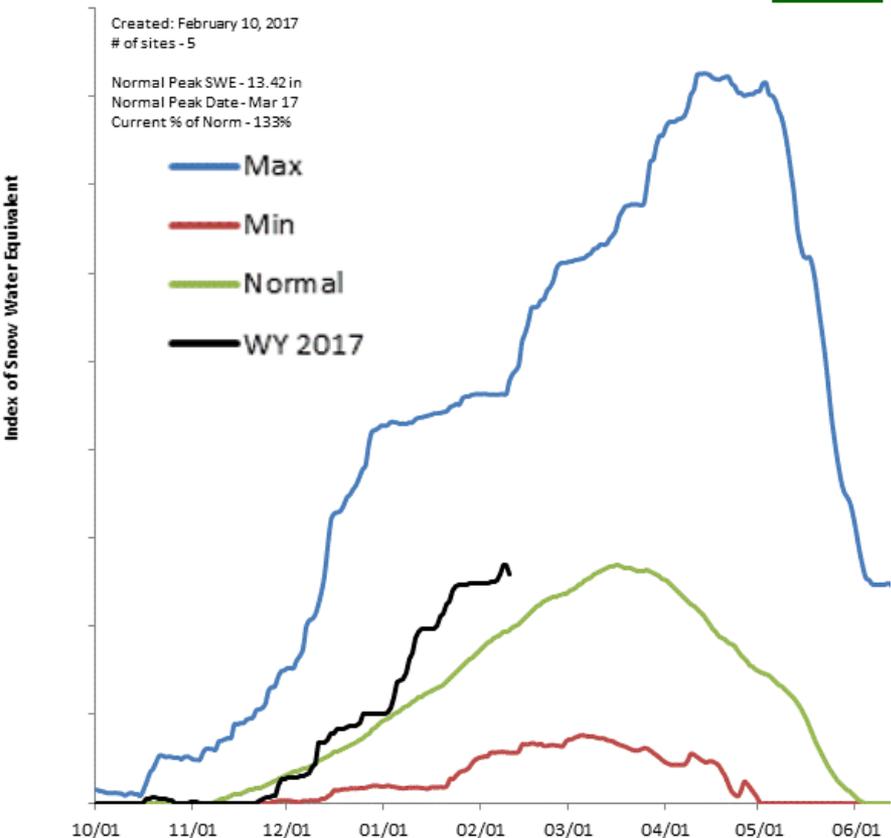
- Max
- Min
- Normal
- WY 2017

Index of Snow Water Equivalent

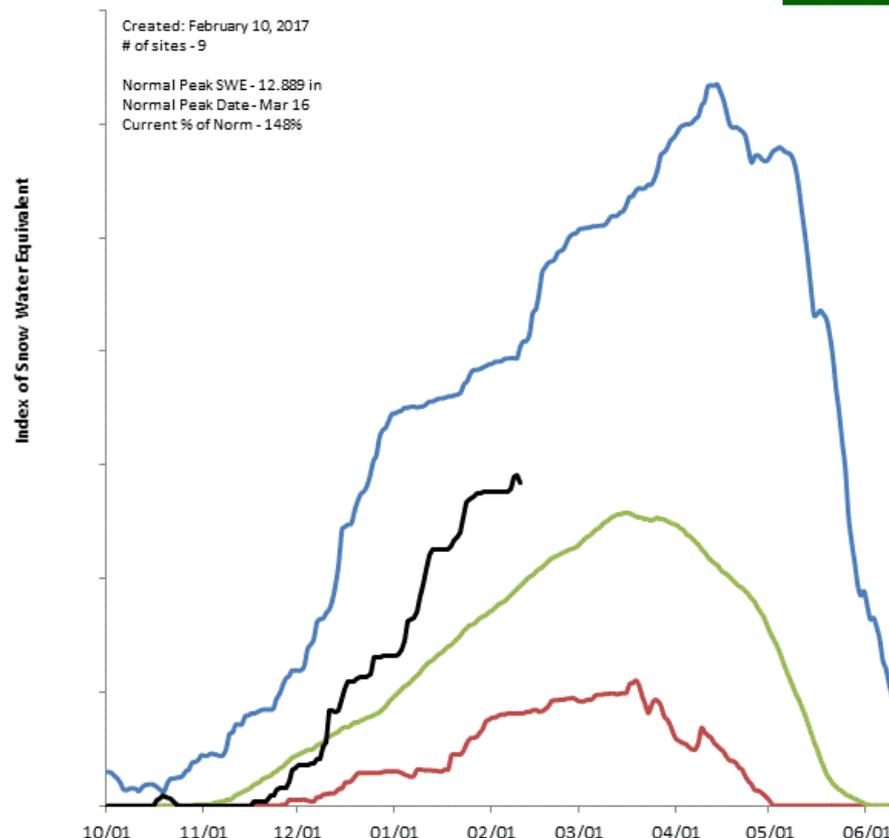
TRUCKEE RIVER BASIN Time Series Snowpack Summary
Based on Provisional SNOTEL data as of Feb 09, 2017



Lower Humboldt River Basin - SWE Index



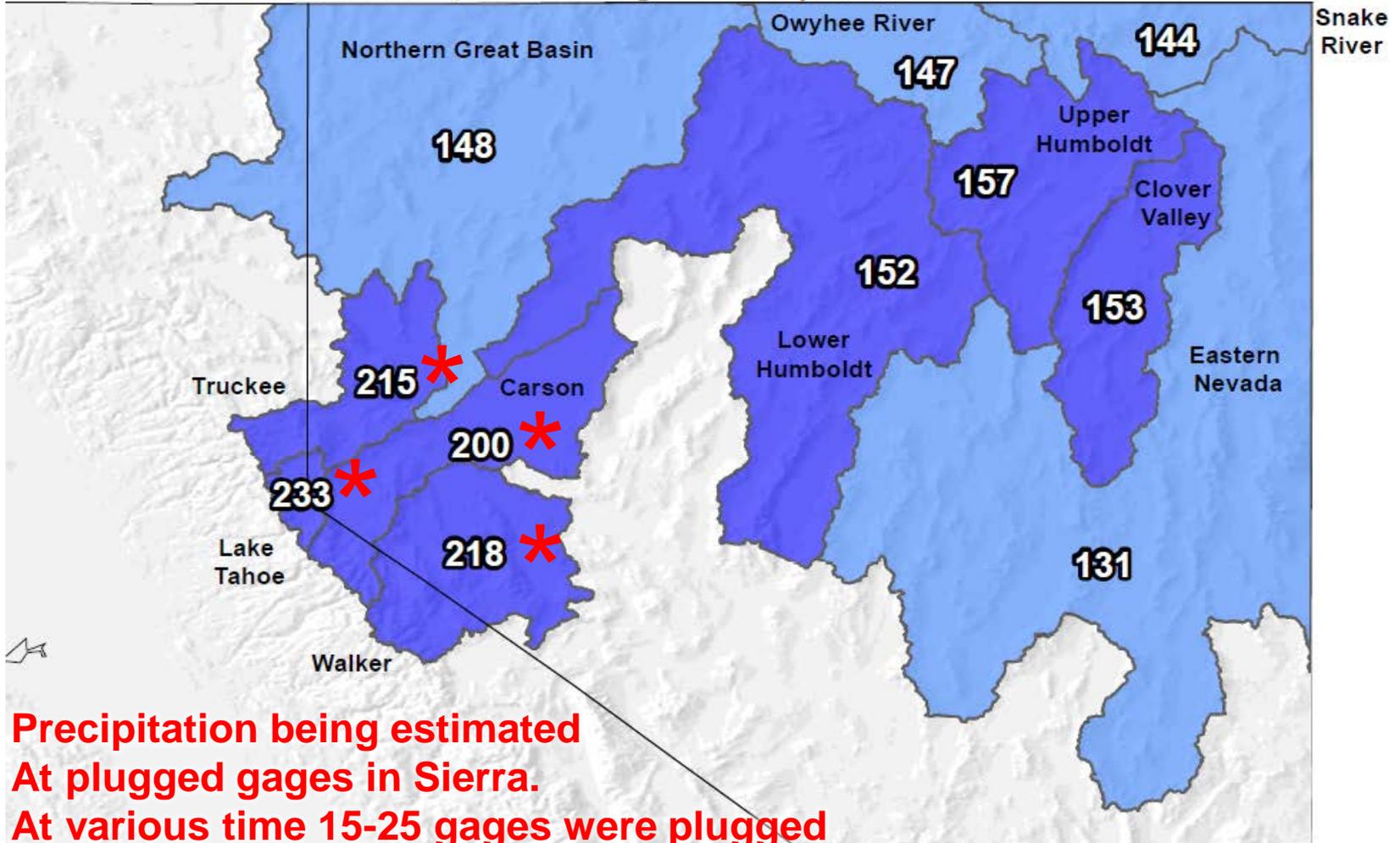
Upper Humboldt River Basin - SWE Index



Current snowpack already at or above normal (median) peak amounts

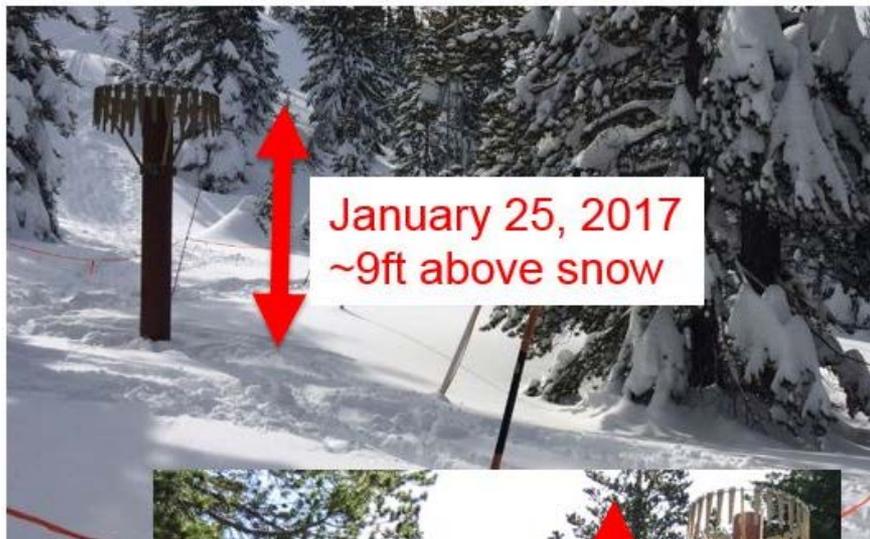


Nevada & Eastern Sierra Water Year to Date Precipitation October 1, 2016 through February 1, 2017



**Precipitation being estimated
At plugged gages in Sierra.
At various time 15-25 gages were plugged**

Precipitation Gage Snow Plugs



Worst Case Scenario

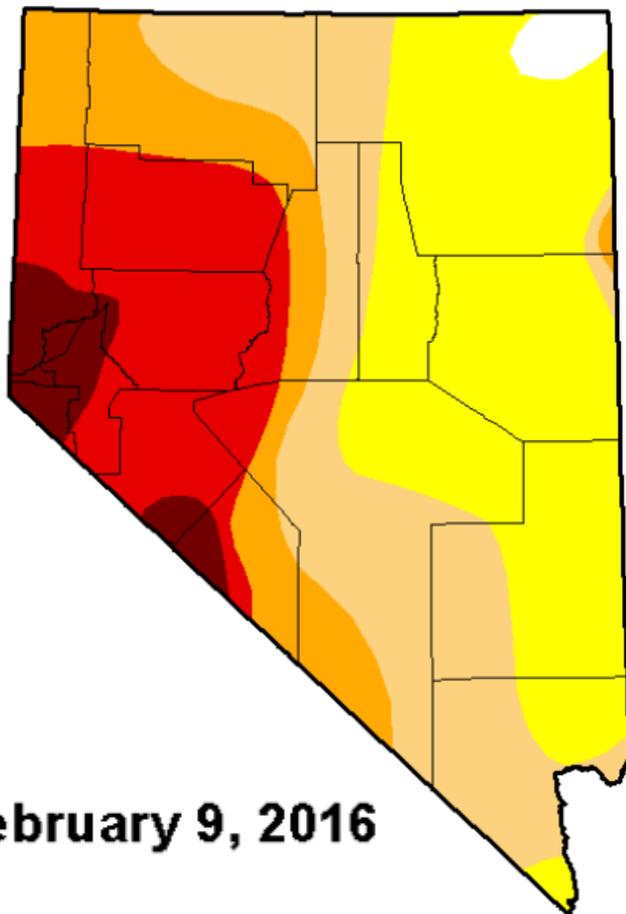


Moose Creek
SNOTEL, Idaho

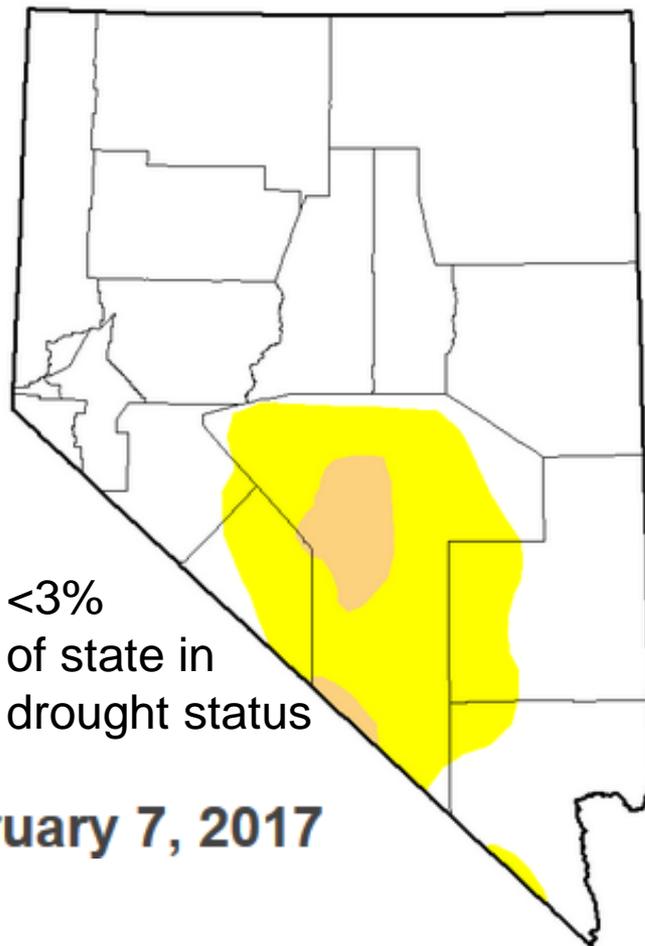


Deadwood SNOTEL, Idaho

U.S. Drought Monitor



February 9, 2016



<3%
of state in
drought status

February 7, 2017

Intensity:

 D0 (Abnormally Dry)

 D2 (Severe Drought)

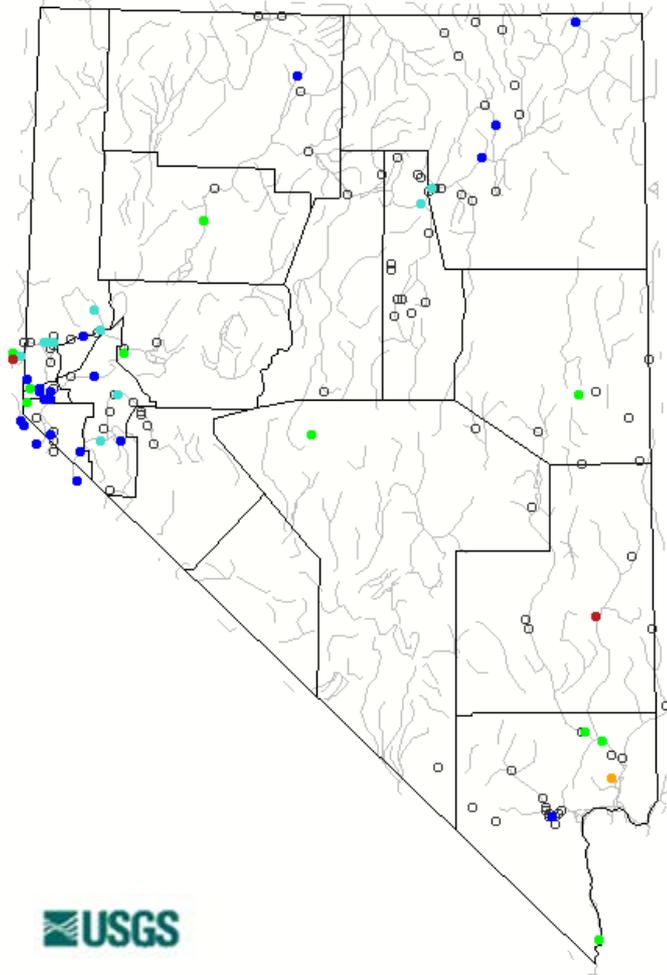
 D4 (Exceptional Drought)

 D1 (Moderate Drought)

 D3 (Extreme Drought)



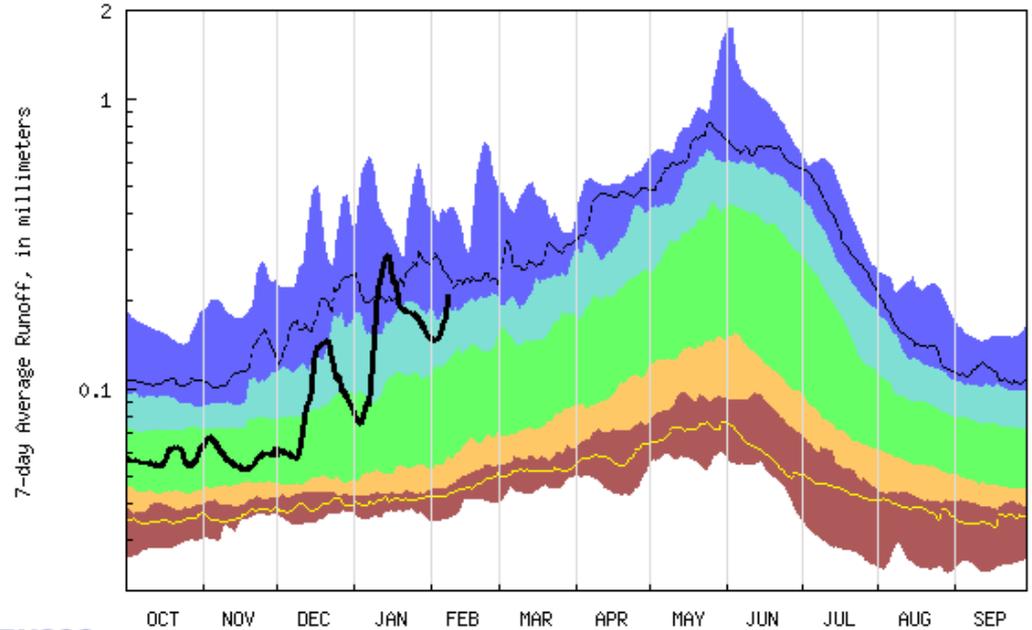
Map of 28-day average streamflow compared to historical streamflow for the day of the year (Nevada)



Explanation - Percentile classes

Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

Duration hydrograph of 7-day average runoff for Nevada



Last updated: 2017-02-09

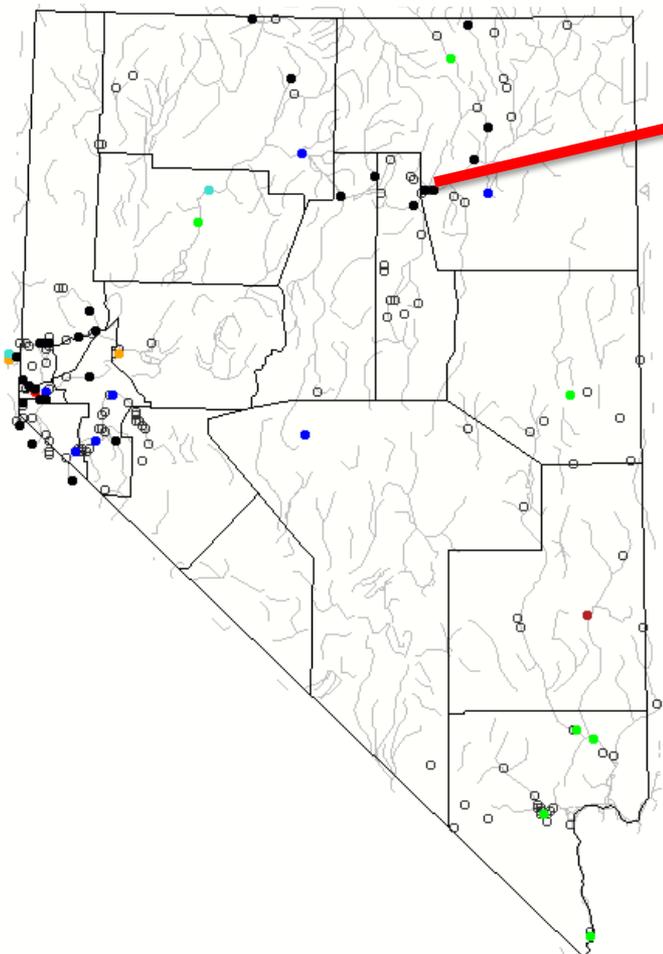
Explanation - Percentile classes

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



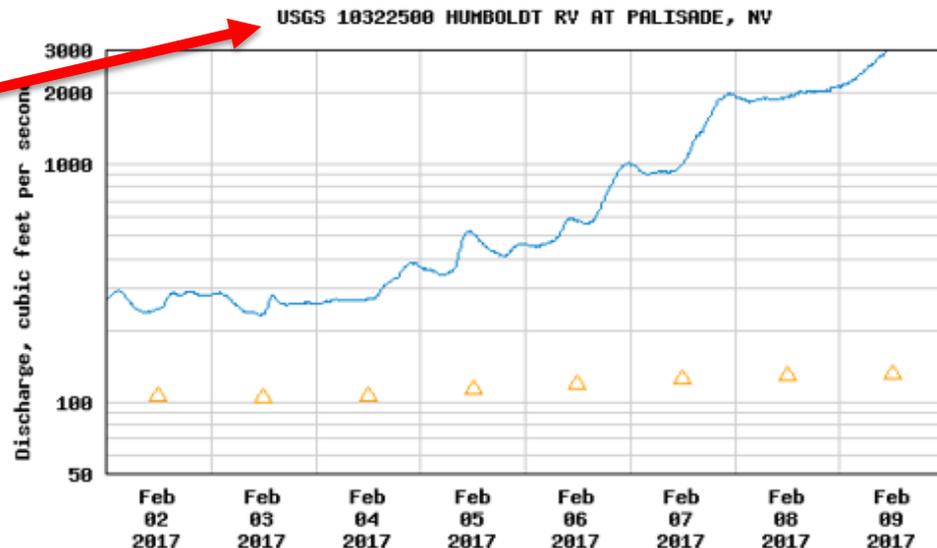
Map of real-time streamflow compared to historical streamflow for the day of the year (Nevada)

Thursday, February 09, 2017 13:30ET



Discharge, cubic feet per second

Most recent instantaneous value: 2990 02-09-2017 11:00 PST



----- Provisional Data Subject to Revision -----

△ Median daily statistic (109 years) — Discharge

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Daily discharge, cubic feet per second -- statistics for Feb 9 based on 109 years of record [more](#)

Min (1932)	25th percentile	Median	Mean	75th percentile	Max (1951)	Most Recent Instantaneous Value Feb 9
20	82	132	190	226	1580	2990

Explanation - Percentile classes

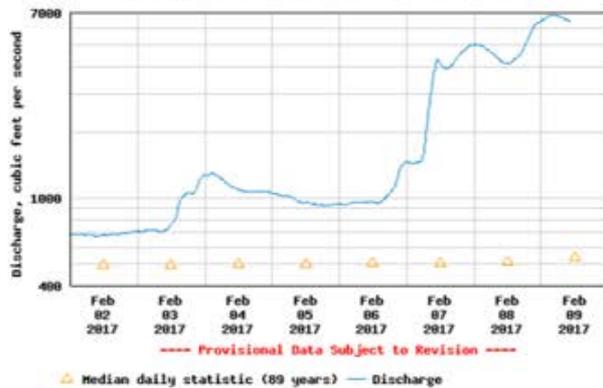
●	●	●	●	●	●	●	○
Low	<10 Much below normal	10-24 Below normal	25-75 Normal	76-90 Above normal	>90 Much above normal	High	Not-ranked



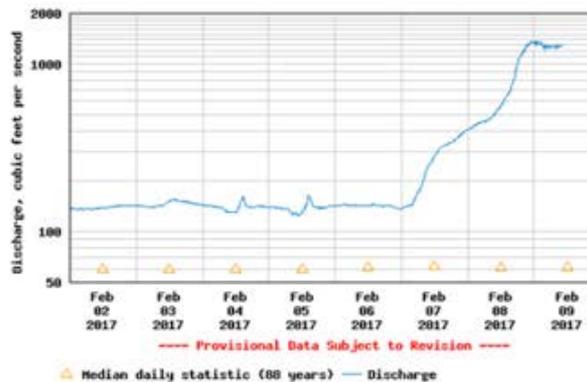
Discharge, cubic feet per second

Most recent instantaneous value: 3150 02-09-2017 11:15 PST

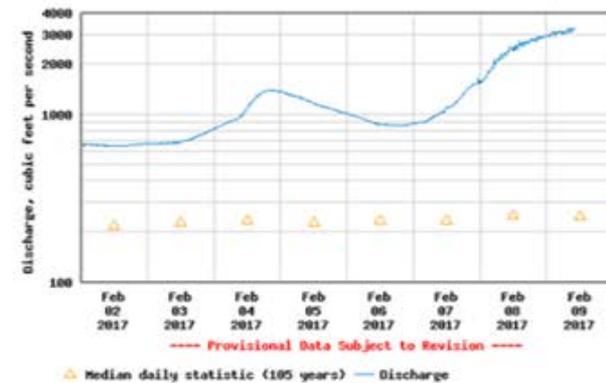
USGS 10350000 TRUCKEE RV AT VISTA, NV



USGS 10296500 W WALKER RV NR COLEVILLE, CA



USGS 10312000 CARSON RV NR FORT CHURCHILL, NV



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Daily discharge, cubic feet per second -- statistics for Feb 9 based on 89 years of record [more](#)

Daily discharge, cubic feet per second -- statistics for Feb 9 based on 88 years of record [more](#)

Daily discharge, cubic feet per second -- statistics for Feb 9 based on 105 years of record [more](#)

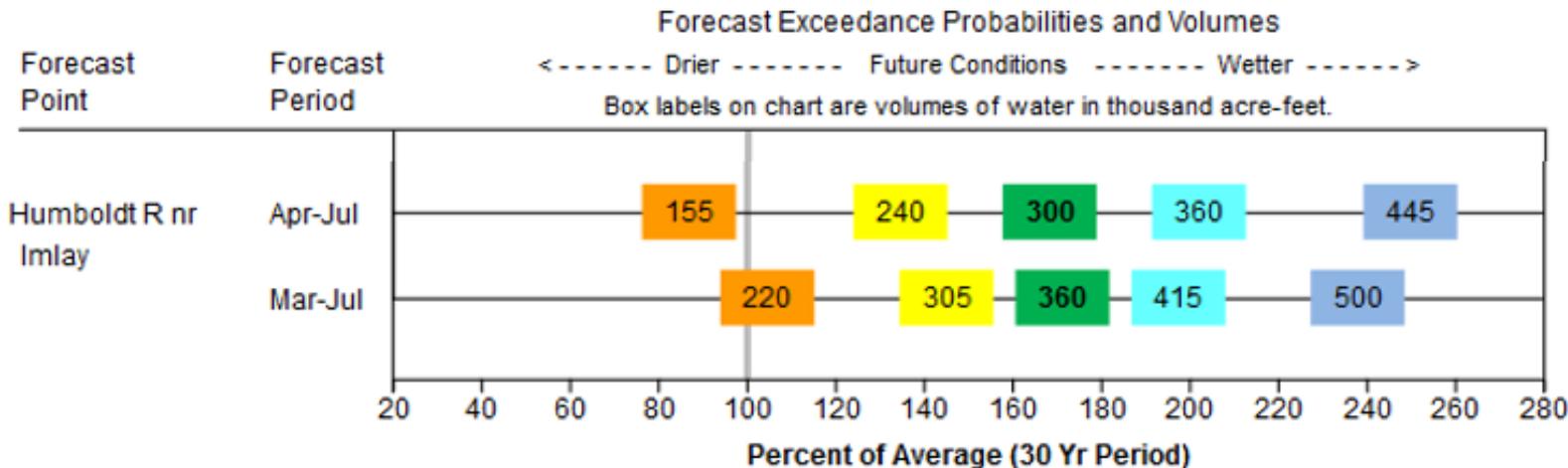
Min (1991)	25th percentile	Median	Mean	75th percentile	Max (1997)	Most Recent Instantaneous Value Feb 9
120	387	536	801	839	4050	6420

Min (1989)	25th percentile	Median	Mean	75th percentile	Max (1996)	Most Recent Instantaneous Value Feb 9
32	49	61	74	90	237	1310

Min (1961)	25th percentile	Median	Mean	75th percentile	Max (1999)	Most Recent Instantaneous Value Feb 9
67	169	246	345	412	1830	3150

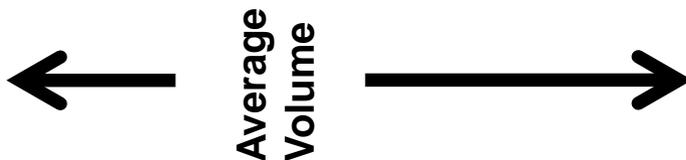


Lower Humboldt River Basin Water Supply Forecasts February 1, 2017



Numbers inside boxes are KAF for 5 exceedances

Below Average Volume



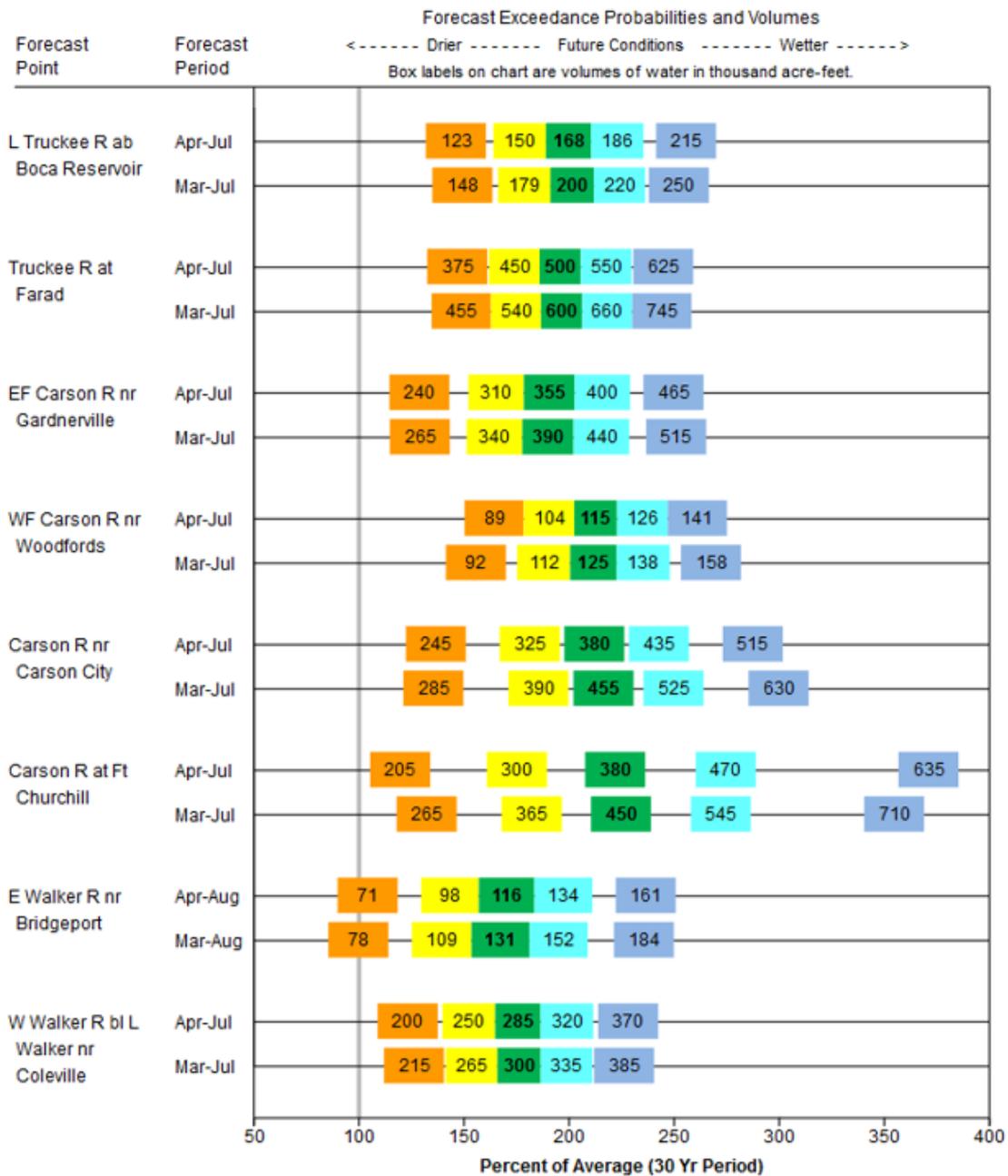
Above Average Volume

Colors represent different exceedance forecasts

90% Exceedance Forecast (KAF)	70% Exceedance Forecast (KAF)	50% Exceedance Forecast (KAF)	30% Exceedance Forecast (KAF)	10% Exceedance Forecast (KAF)
95% Exceedance	There is a 70% chance that flows will exceed this volume	There is a 50% chance that flows will exceed this volume	There is a 30% chance that flows will exceed this volume	5% Exceedance



Eastern Sierra Basin Summary
Water Supply Forecasts
February 1, 2017



Summer Streamflow Forecasts

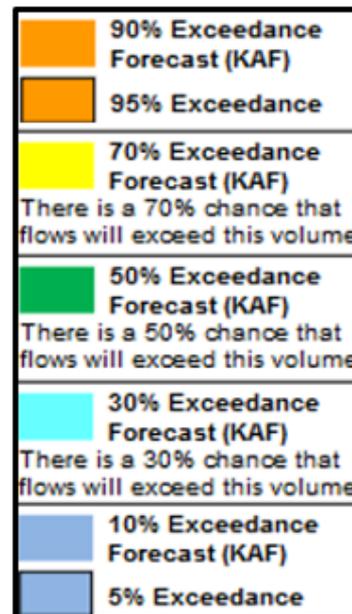
Key Forecasts:

Truckee River at Farad 195%

Carson River near Fort Churchill 225%

East Walker River near Bridgeport 168%

West Walker River near Coleville 182%



Drier Future



Normal Future Precipitation



Wetter Future

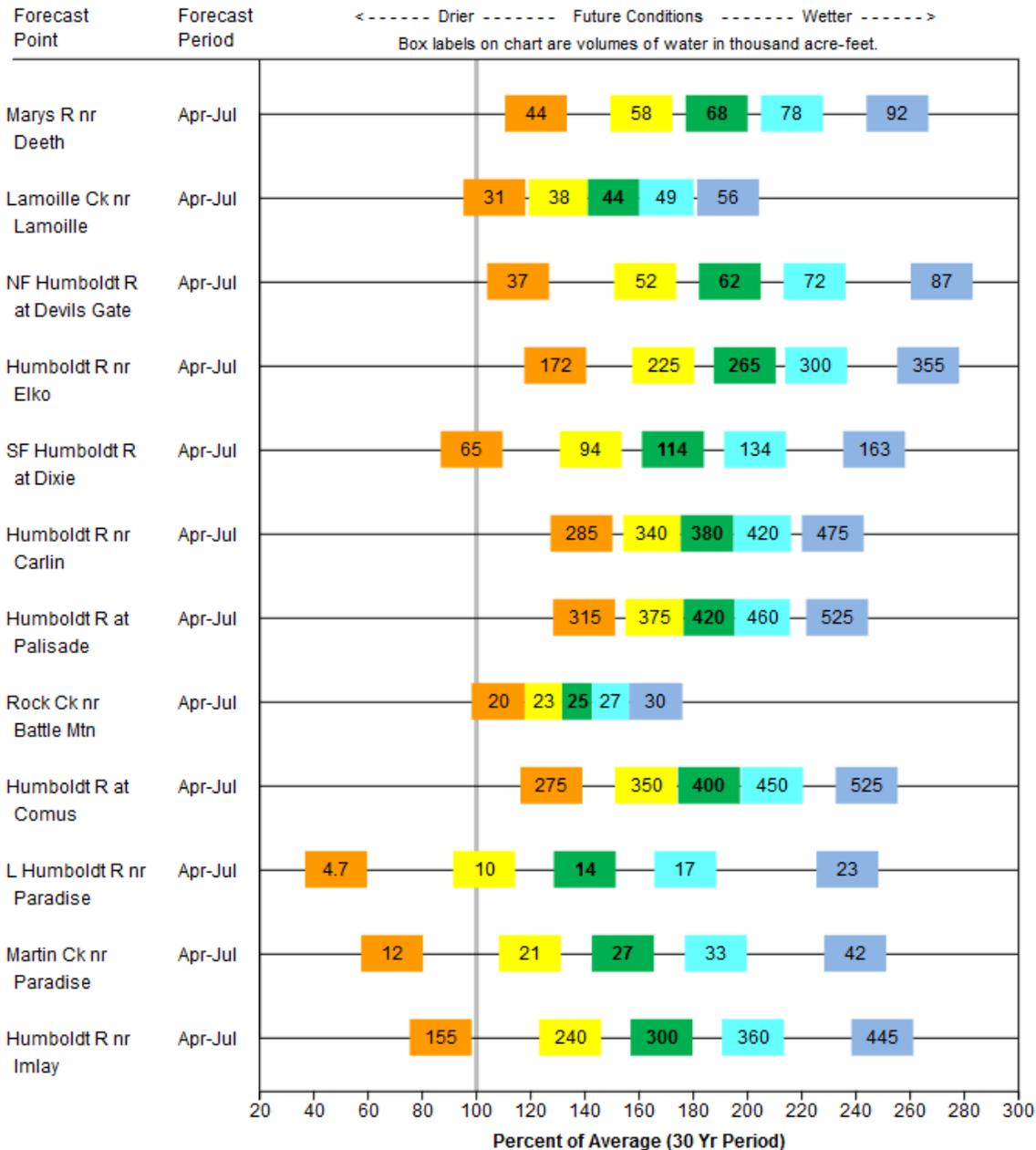


Humboldt River Summary Water Supply Forecasts February 1, 2017

Forecast Exceedance Probabilities and Volumes

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

Box labels on chart are volumes of water in thousand acre-feet.

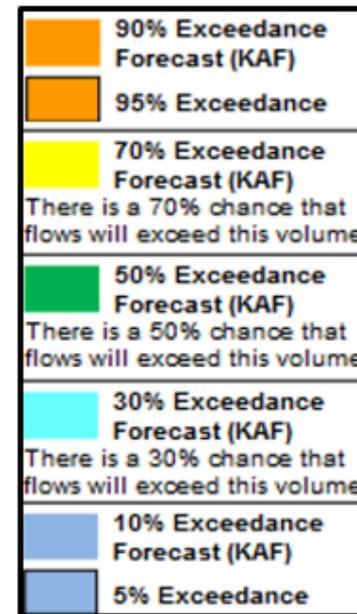


Summer Streamflow Forecasts

Key Forecasts:

Humboldt River near Elko 201%

Humboldt River near Imlay 172%



Drier Future

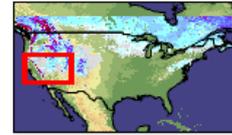
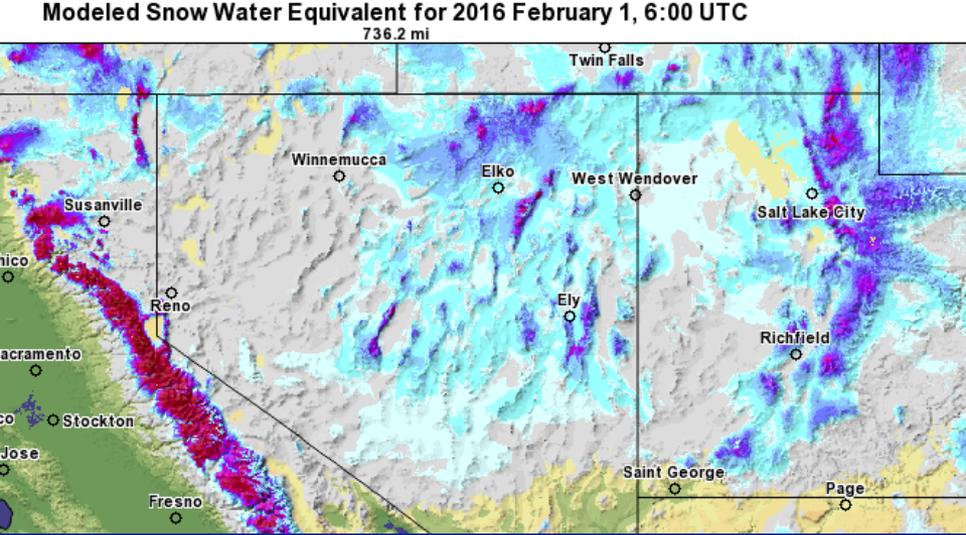


Normal Future Precipitation

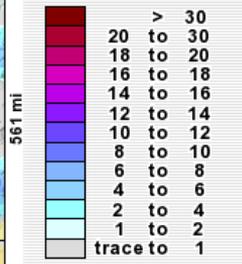


Wetter Future

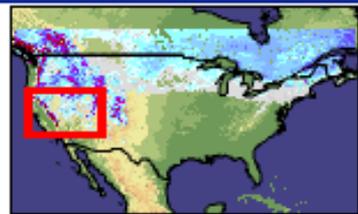
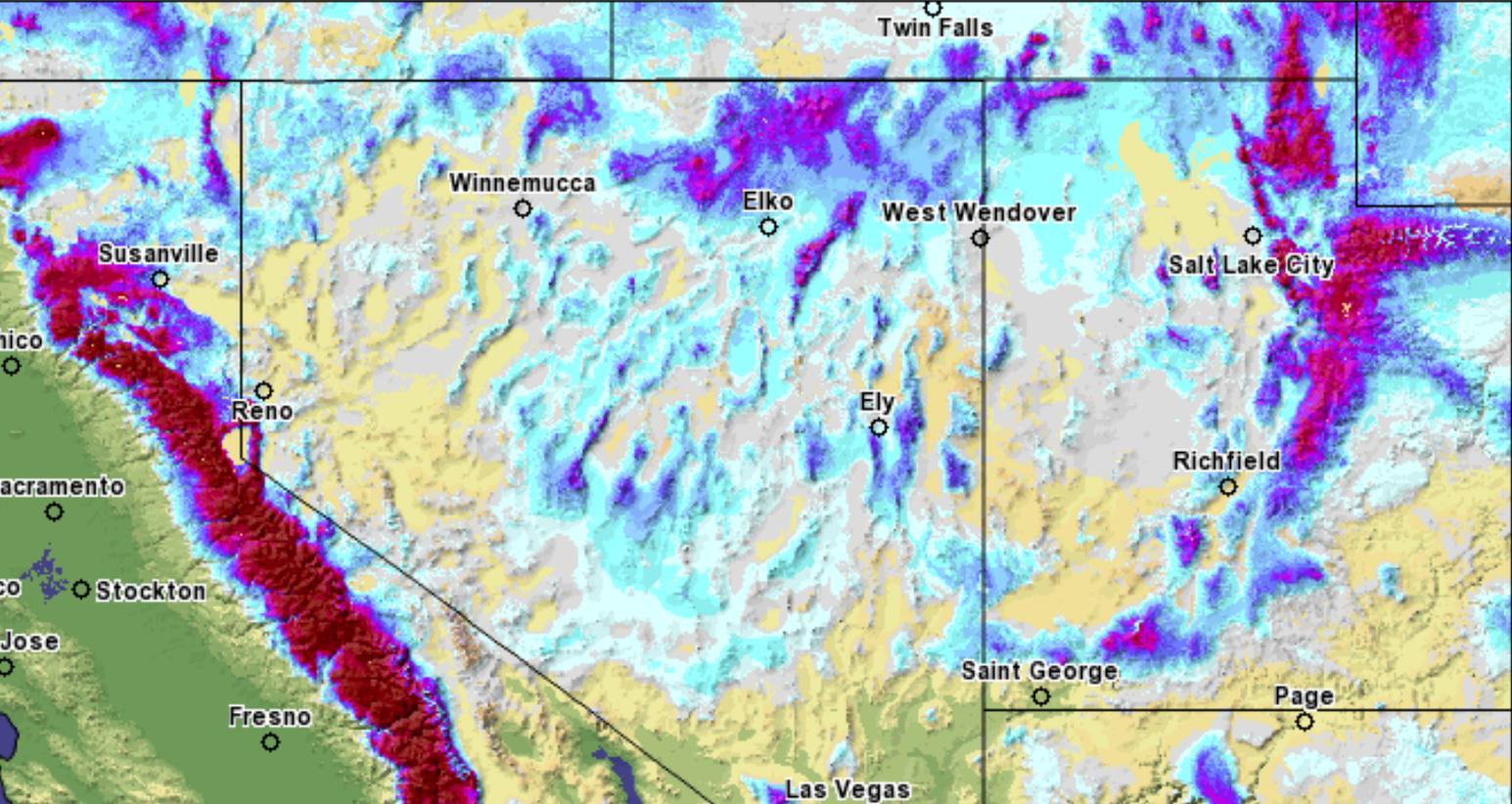




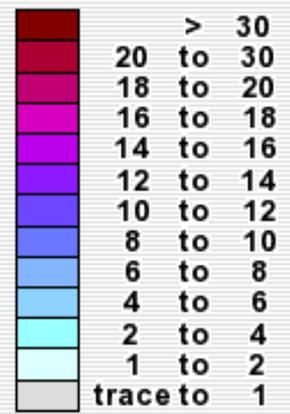
Inches of water equivalent



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



Inches of water equivalent



Not Estimated



Dam failure caused flash flooding in east central Elko County, Nevada. (KSL TV)

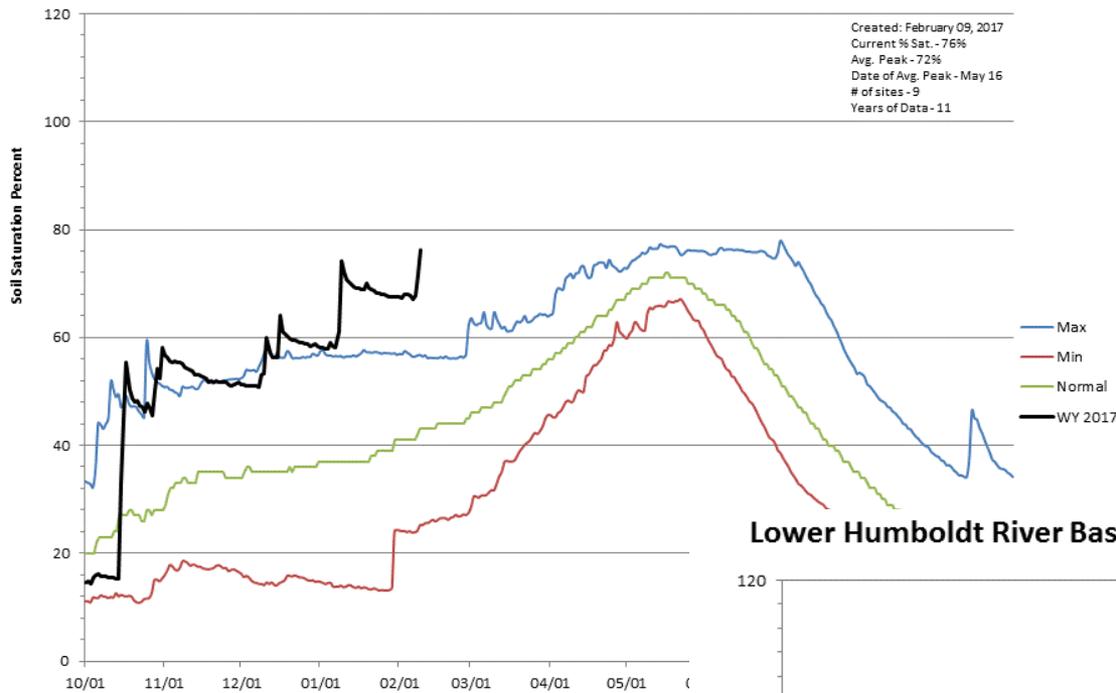
2/8/2017

MONTELO, Nevada — A broken dam in Elko County, Nevada, flooded farmland and homes in the community of Montello, stopped Union Pacific trains nearby and prompted a warning to people in extreme northwest Utah to avoid the rural highway into the Silver State.

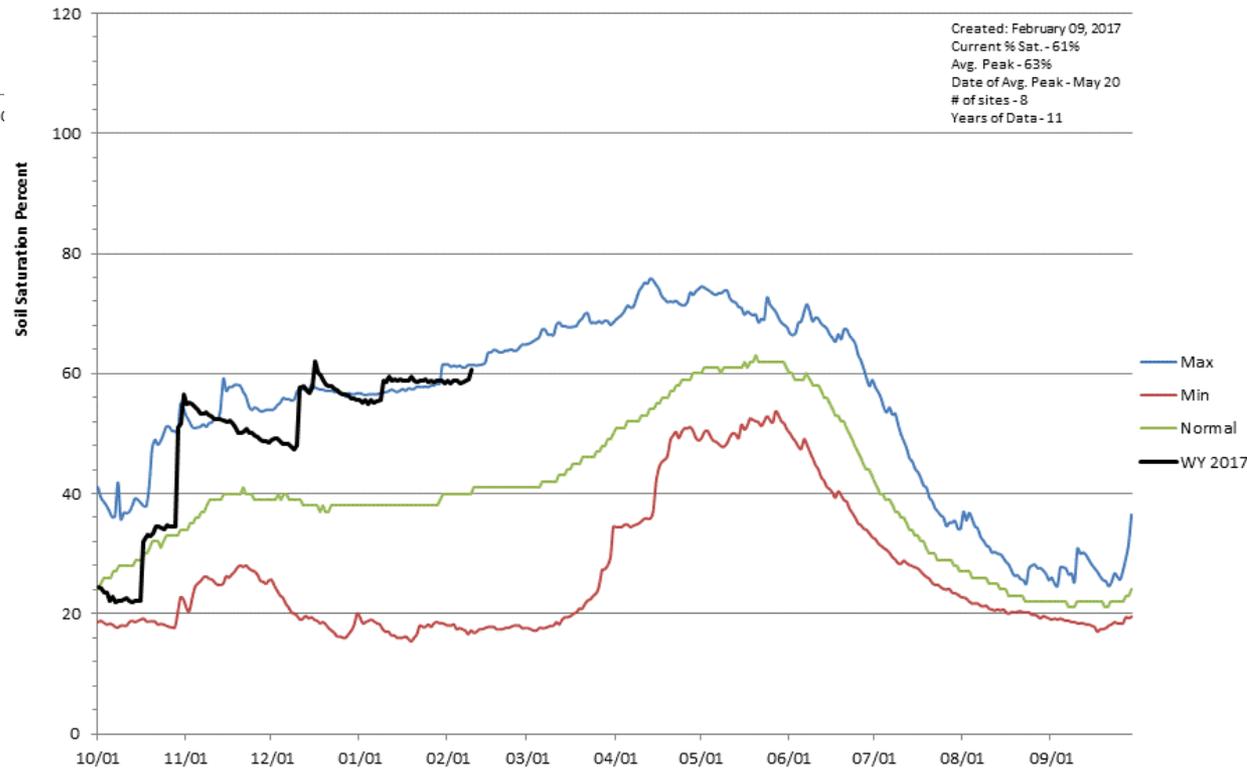
#Flooduary



Carson River Basin - Soil Saturation

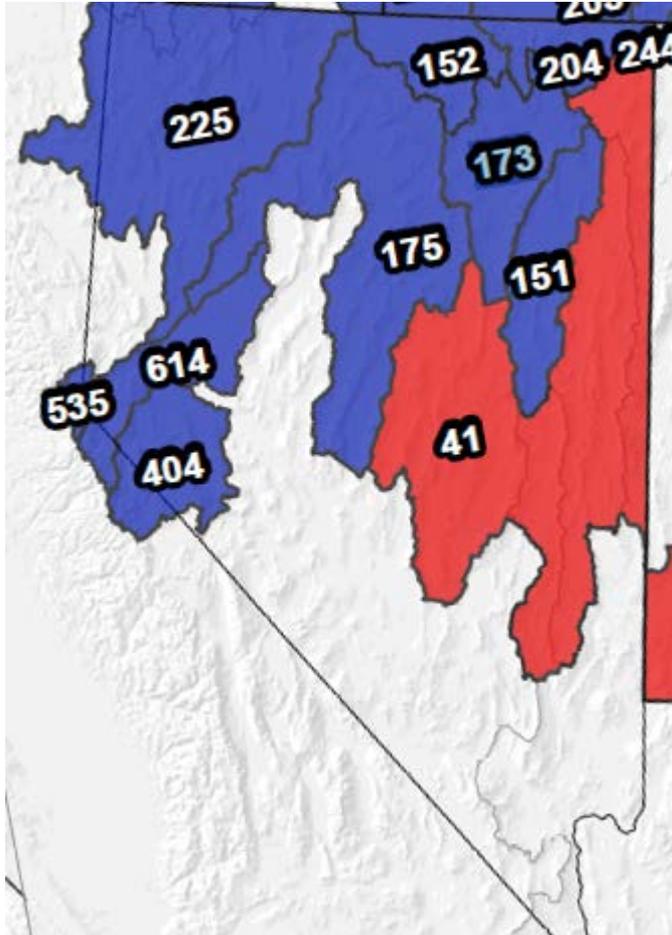


Lower Humboldt River Basin - Soil Saturation



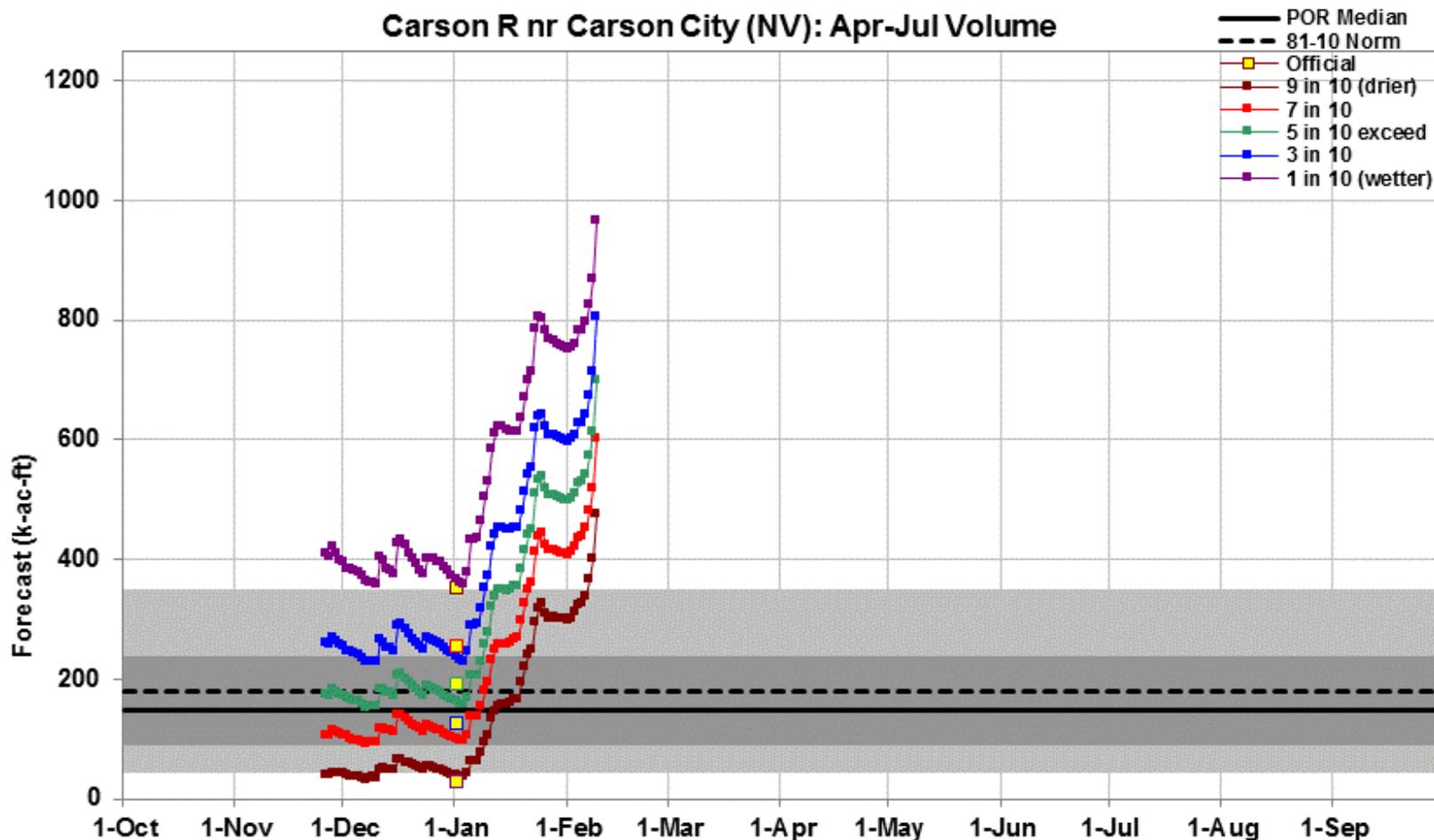
February Precipitation Summary

Month-to-Date through Feb 1-10th



Month to Date Precipitation as Percent of Average February Total

LAKE TAHOE	
Basin Index (%)	138
TRUCKEE RIVER	
Basin Index (%)	142
CARSON RIVER	
Basin Index (%)	133
WALKER RIVER	
Basin Index (%)	92
UPPER HUMBOLDT RIVER	
Basin Index (%)	46
LOWER HUMBOLDT RIVER	
Basin Index (%)	48

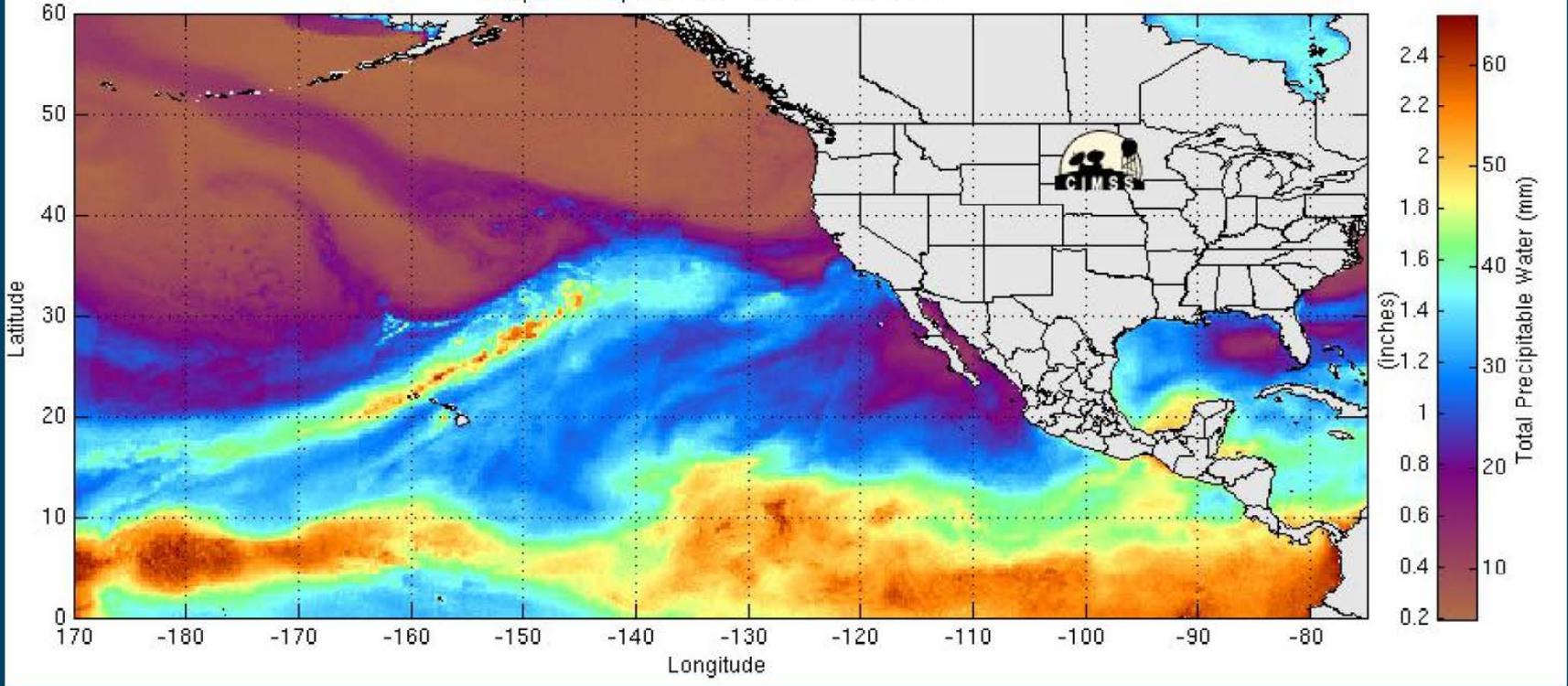


This is an automated product based solely on SNOTEL data, provisional data are subject to change. This product is a statistically based guidance forecast combining indices of snowpack and precipitation. **Yellow squares** are the official outlooks. **Gray background** is the historical period of record variability. This product does not consider climate information such as El Nino or short range weather forecasts, or a variety of other factors considered in the official forecasts. This product is not meant to replace or supercede the official forecasts produced in coordination with the National Weather Service. Science Contact: Cara.s.McCarthy@por.usda.gov www.wcc.nrcs.usda.gov/wsf/daily_forecasts.html



Atmospheric River Satellite

Morphed composite: 2017-02-06 11:00:00 UTC

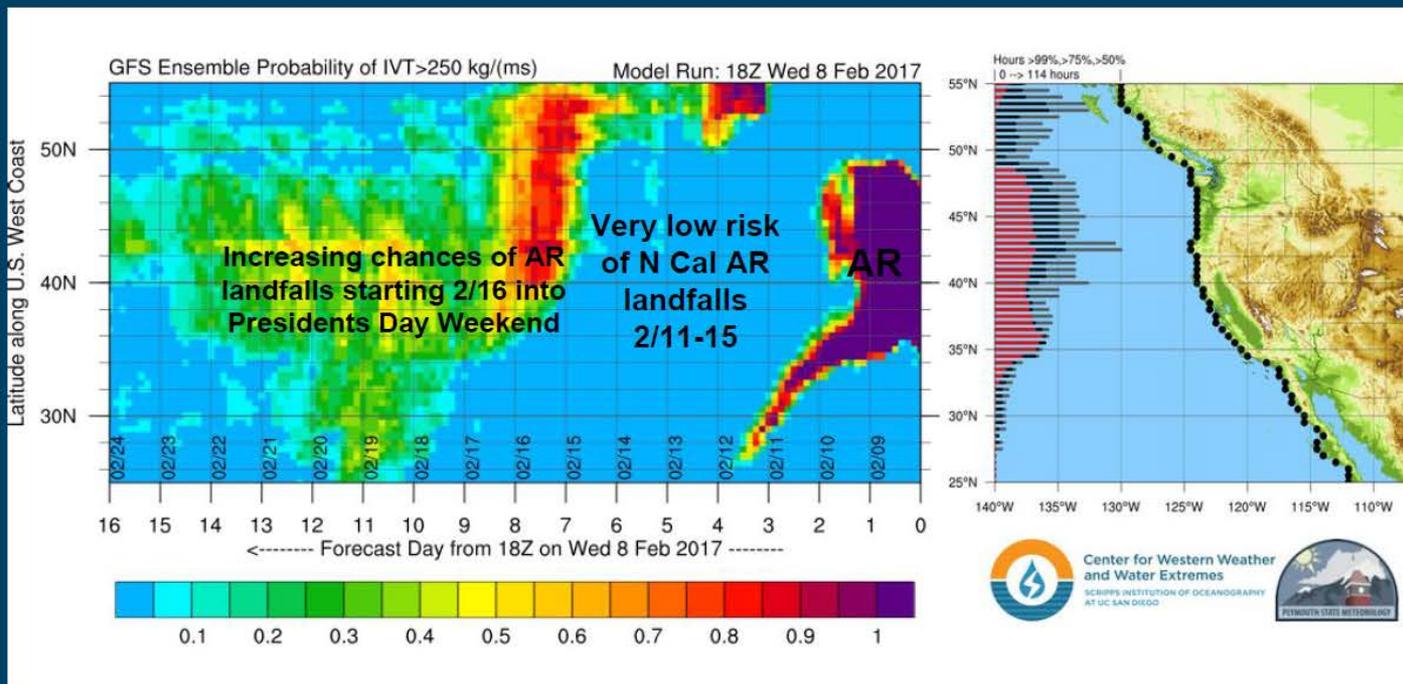


Reno National Weather Service
 Forecasting for the Sierra and western Nevada since 1905



Looking Ahead - 7-14 Day Atmospheric River Outlook

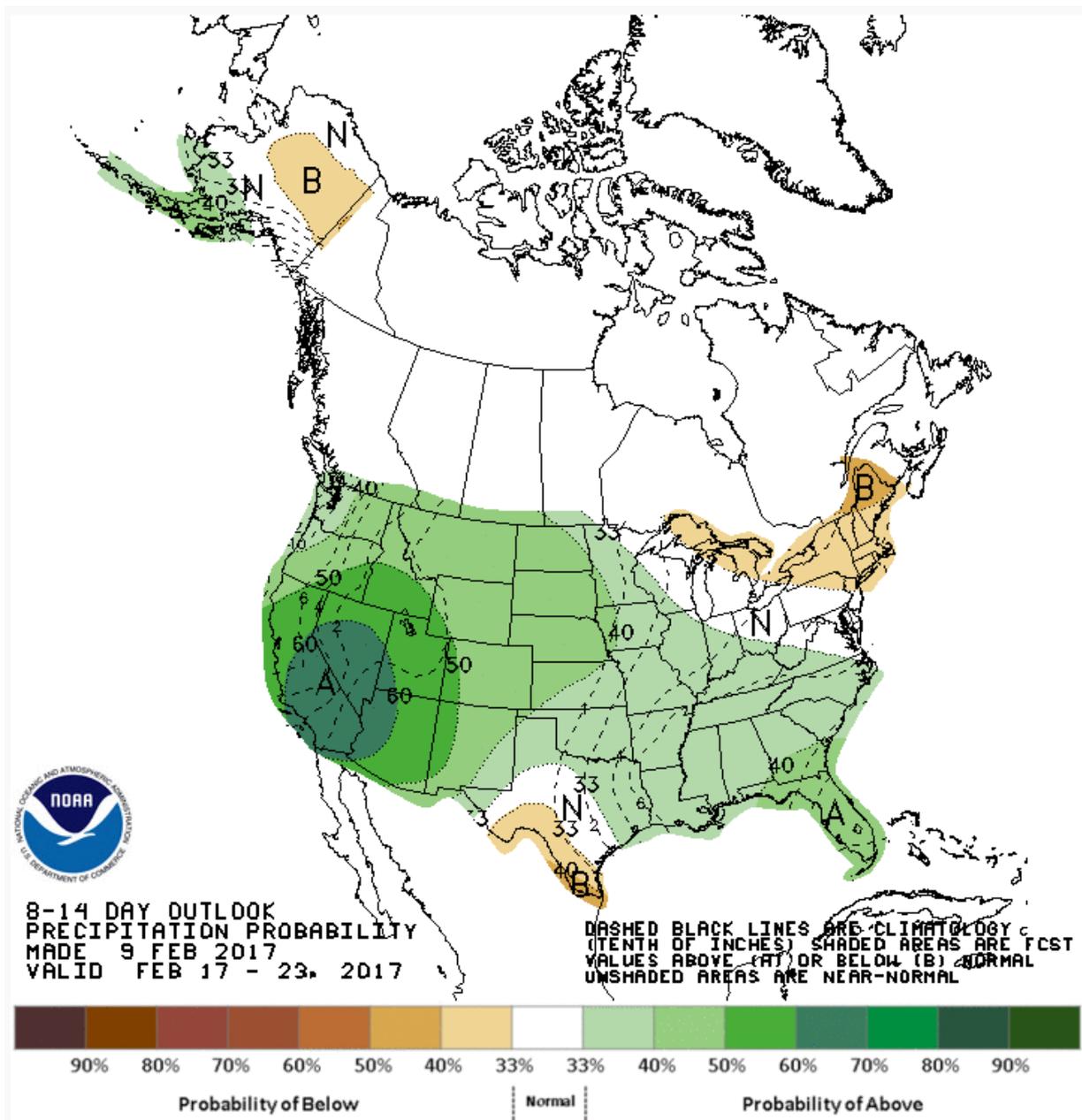
Chart shows the percent of simulations showing atmospheric river (AR) landfall at various latitudes along the west coast. Time into the future goes from right to left. High probabilities do not necessarily mean stronger AR's.



Atmospheric River forecast tools indicate active pattern into N Cal and Nevada through Friday. There does appear to be a ~5 day break in heavy-precipitation storms. Simulations point towards AR landfalls returning around President's Day weekend. Some impressive signals for winter storms this far out.

Reno National Weather Service
Forecasting for the Sierra and western Nevada since 1905







Tue 2/7/2017 11:08 AM

Chris Smallcomb - NOAA Federal <Chris.Smallcomb@noaa.gov>

NWS Reno -- Briefing Materials on Flood, Wind, Snow Hazards this Week; Call Wednesday 10 AM

To _NWS WR REV EM Partners; _NWS WR REV Hydro Partners; _NWS WR REV Fire Partners

Suggested Meetings ▾

Action Items

Hello again! Thanks for attending our briefing - there is a lot to cover in our diverse geography! Here's a link to the briefing materials --

<http://www.wrh.noaa.gov/rev/briefings/NWS-Reno-Briefing-2.7.17.pdf>

Winds already picking back up here at NWS Reno! Please pass along pictures you have of flooding or wind impacts today, and through the rest of the week. That really helps us understand and communicate the issues.

Alex and Tim will be hosting tomorrow's call. Here are the particulars --

Date/time: Wednesday, February 8 @ 10 AM PST

Call In: 415.594.5500 Passcode: 951-317-191

Webinar Link: <https://join.me/nwsrenobriefing> (no need to register ahead of time)

Questions: the best way to ask a question is via webinar chat or just email/call after the briefing.

In the meantime, please email or call if you have specific questions. Stay safe!

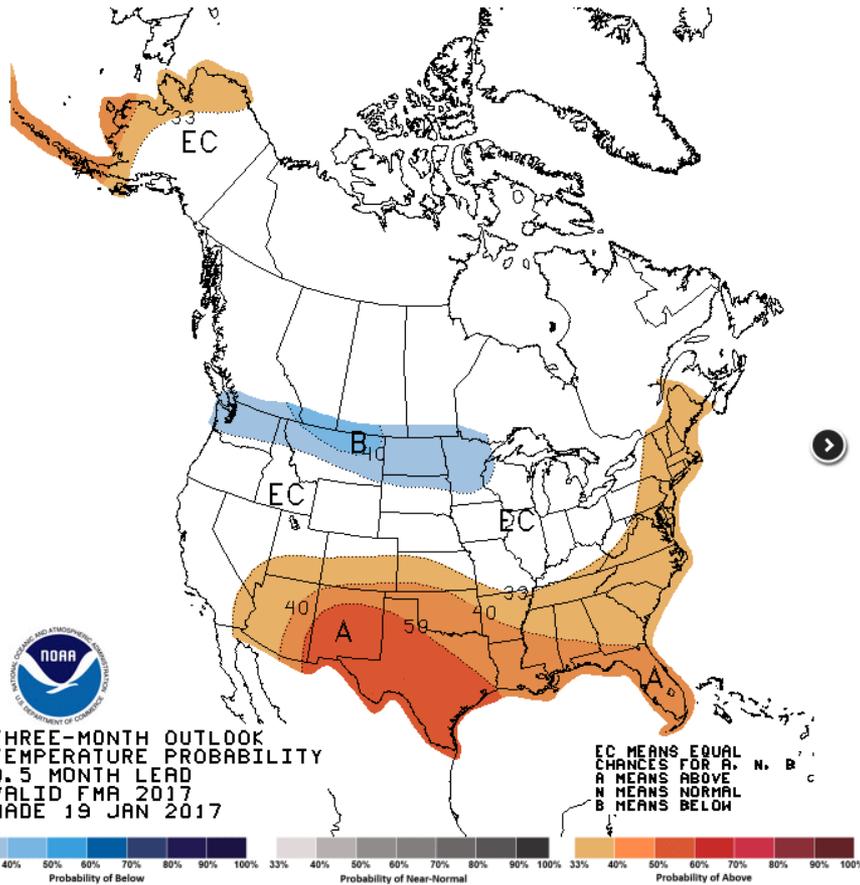
-Chris

Chris Smallcomb, NWS Reno
Warning Coordination Meteorologist
Desk - 775.673.8100 x223

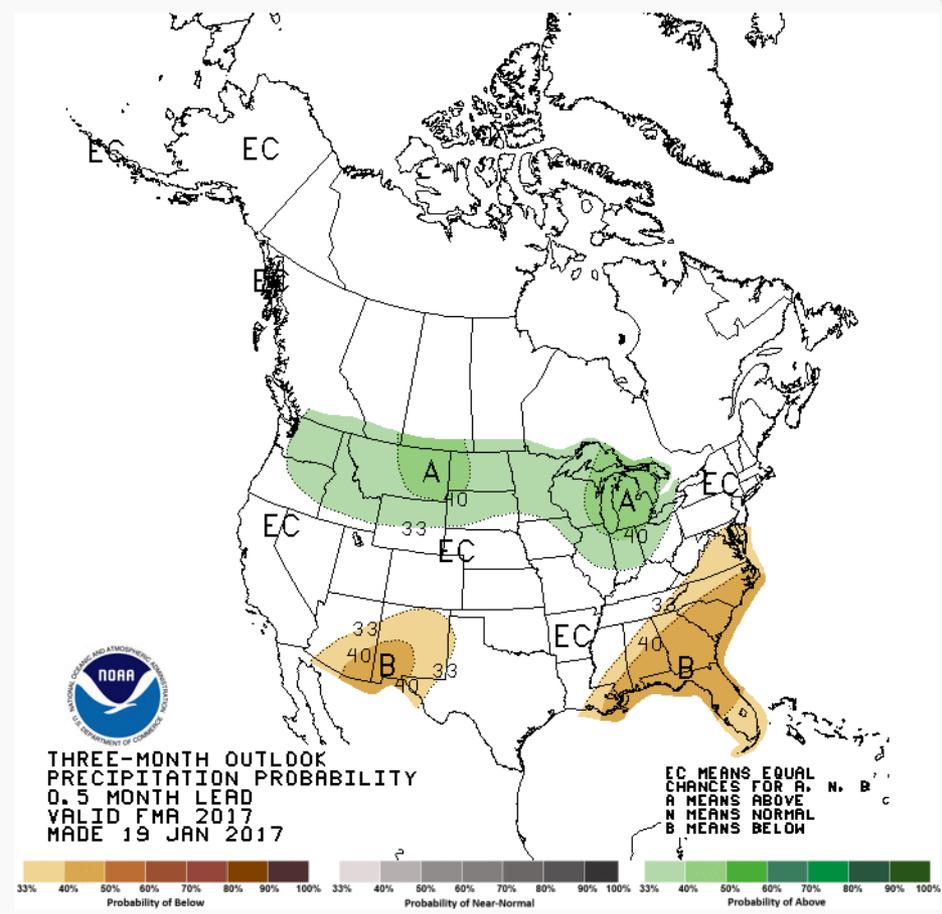


Sign up for NWS briefing updates

3-Month Outlooks (Feb, Mar, Apr)



Temperature



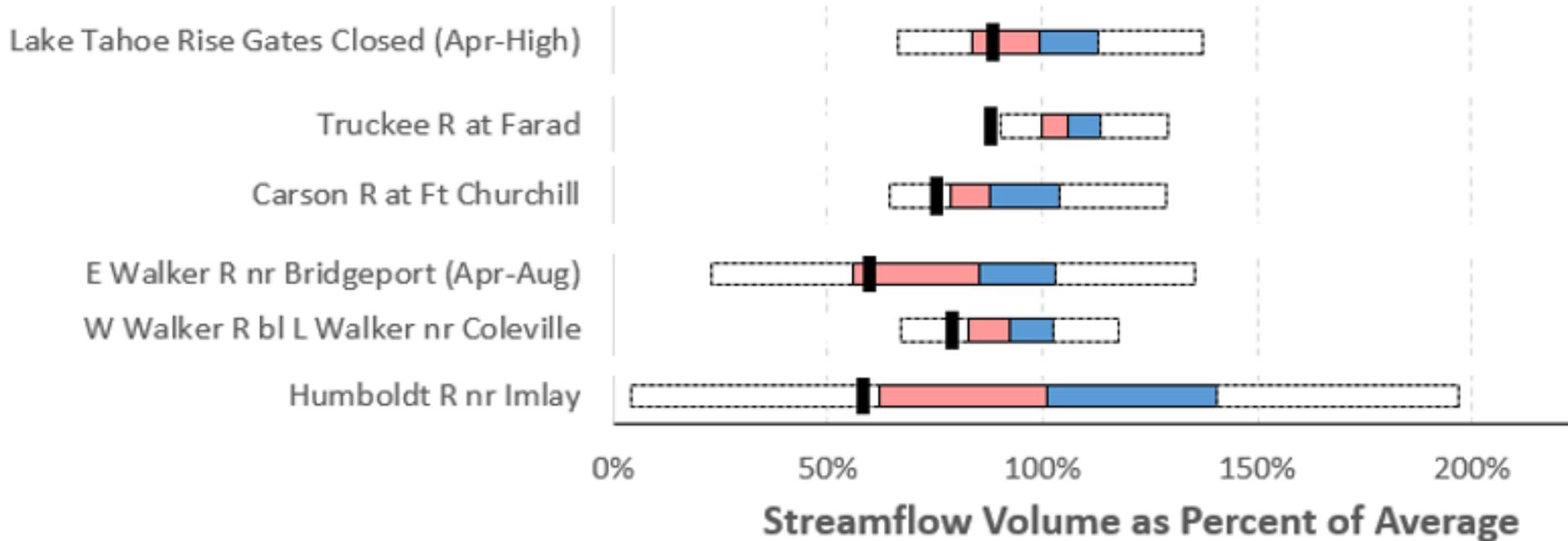
Precipitation

Boom or Bust

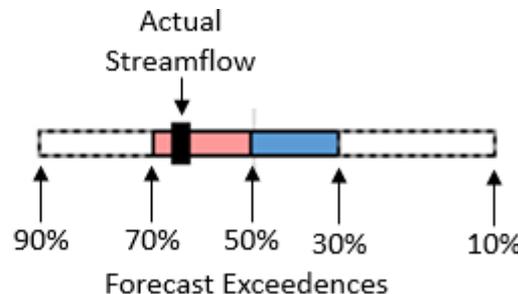


2016 NRCS Streamflow Forecast Review - Nevada

Actual Streamflow vs April 1, 2016 NRCS Streamflow Forecasts for April-July Period (unless otherwise noted)

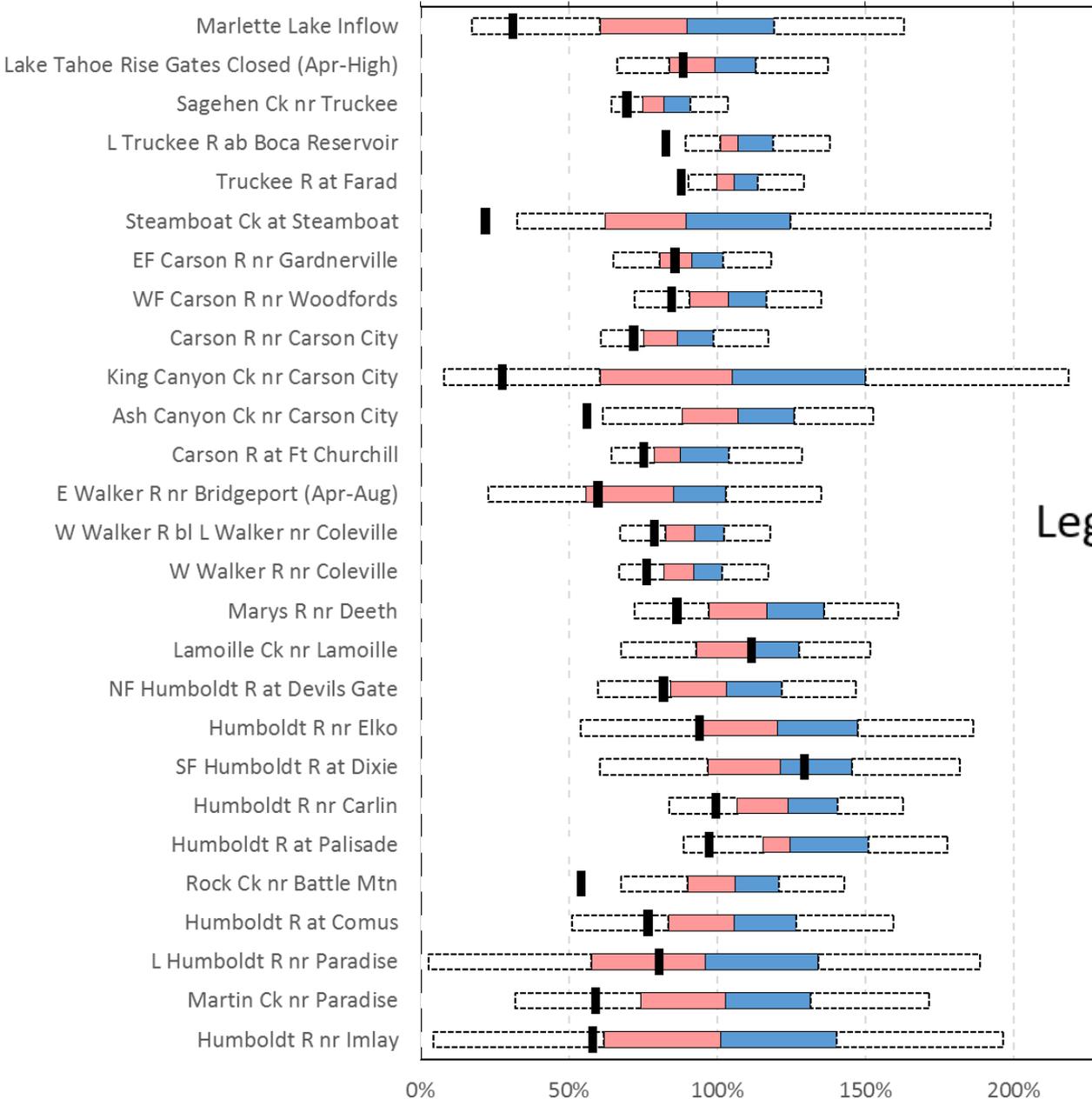


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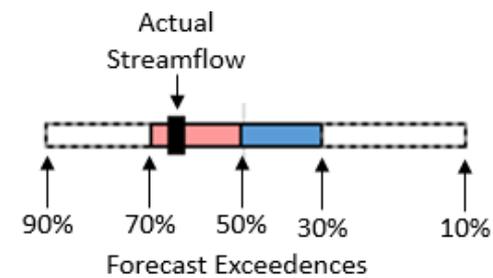


2016 NRCS Streamflow Forecast Review - Nevada

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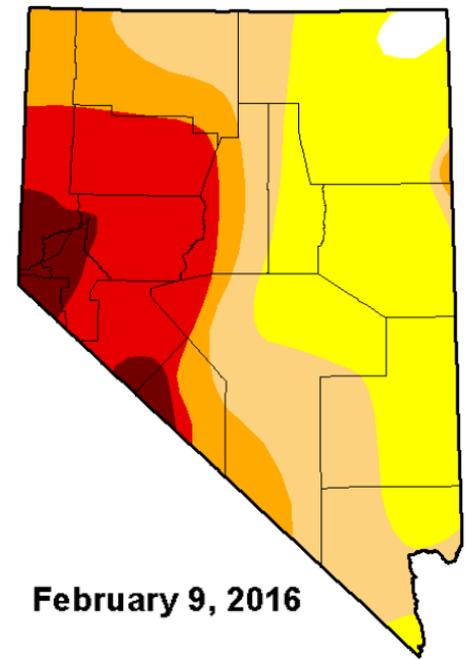
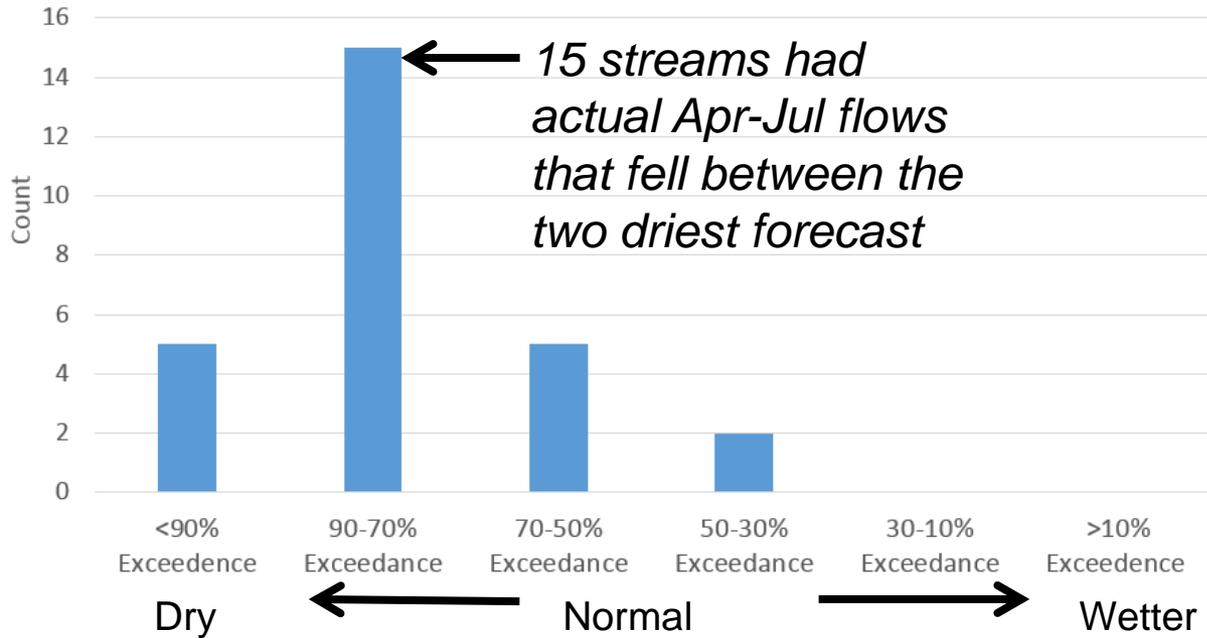


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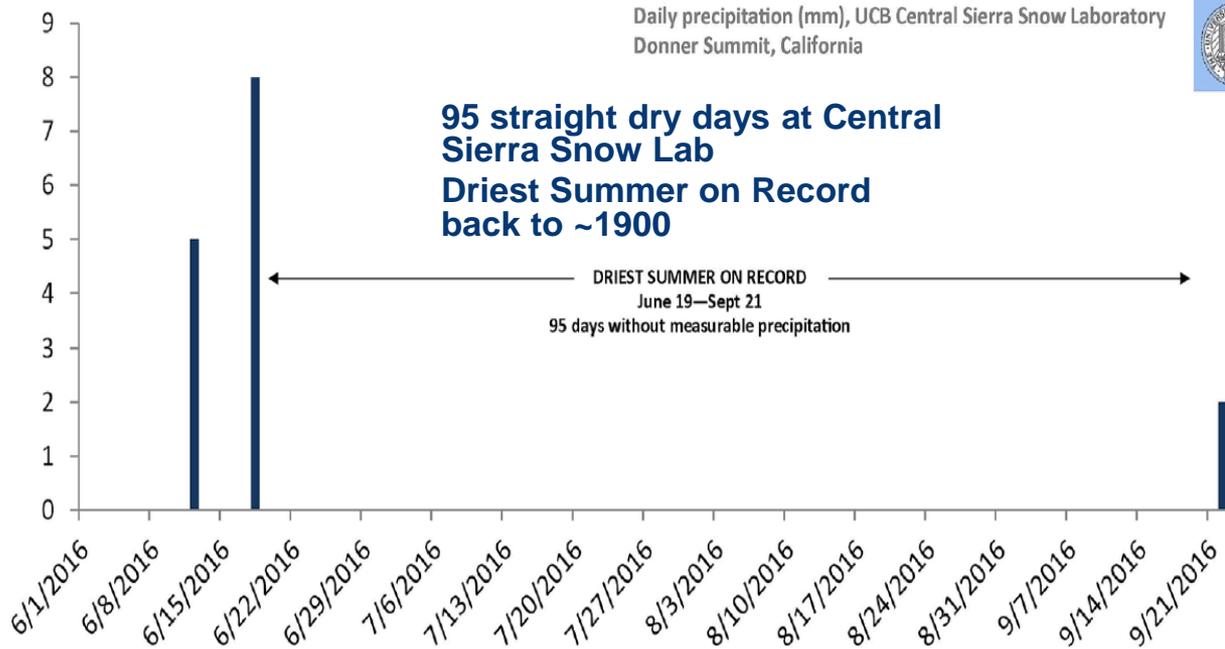


Actual Streamflow Compared to Streamflow Forecast Exceedance Bins

Based on Actual Streamflow vs April 1, 2016 NRCS Streamflow Forecasts



February 9, 2016



*Explanation:
Likely due to the additive effects of 4 years of drought combined with very dry summer*

Key Points:

- In Sierra, record October rains, followed by biggest January on record is creating one of the wettest and snowiest winters since 1981 when SNOTEL sites installed.
- Feb 10th snowpacks in Humboldt basin (~130-150%) in top handful of years, at or above normal peaks. In Sierra basins snowpacks (~200%) are above or near record SNOTEL levels (1981-2017)
- Water year precipitation percentages are a little higher than snowpack percentages due to fall rains. In Sierra precipitation totals include estimated data from gages that are plugged with snow.
- Less than 3% of Nevada is still in drought status.
- Current streamflow conditions: 28-day average flows since December for many streams around northern Nevada are very high (>70% percentile) and current flows are setting new daily maximums.
- Summer Streamflow Forecasts call for far above average runoff this spring. Key points are forecast 170-225% of average. High base flows into summer months likely.
- Good chance that Lake Tahoe and Rye Patch reservoir will fill this year.
- Soil moisture is very high at near springtime snowmelt levels, runoff is and will be very efficient.
- February already above normal in Sierra compared to monthly averages, Humboldt basin on track for an average month
- Future weather – February will continue to be wet. Beyond that forecasts call for equal chances. The persistence forecast would suggest, it been wet and it will continue to be wet. Time will tell if snowpack beats springtime maximums in Sierra.
- Actual streamflow last summer ended up on the drier end of the April 1, 2016 forecasts exceedances. This was due to multi-year drought and dry summer conditions.

