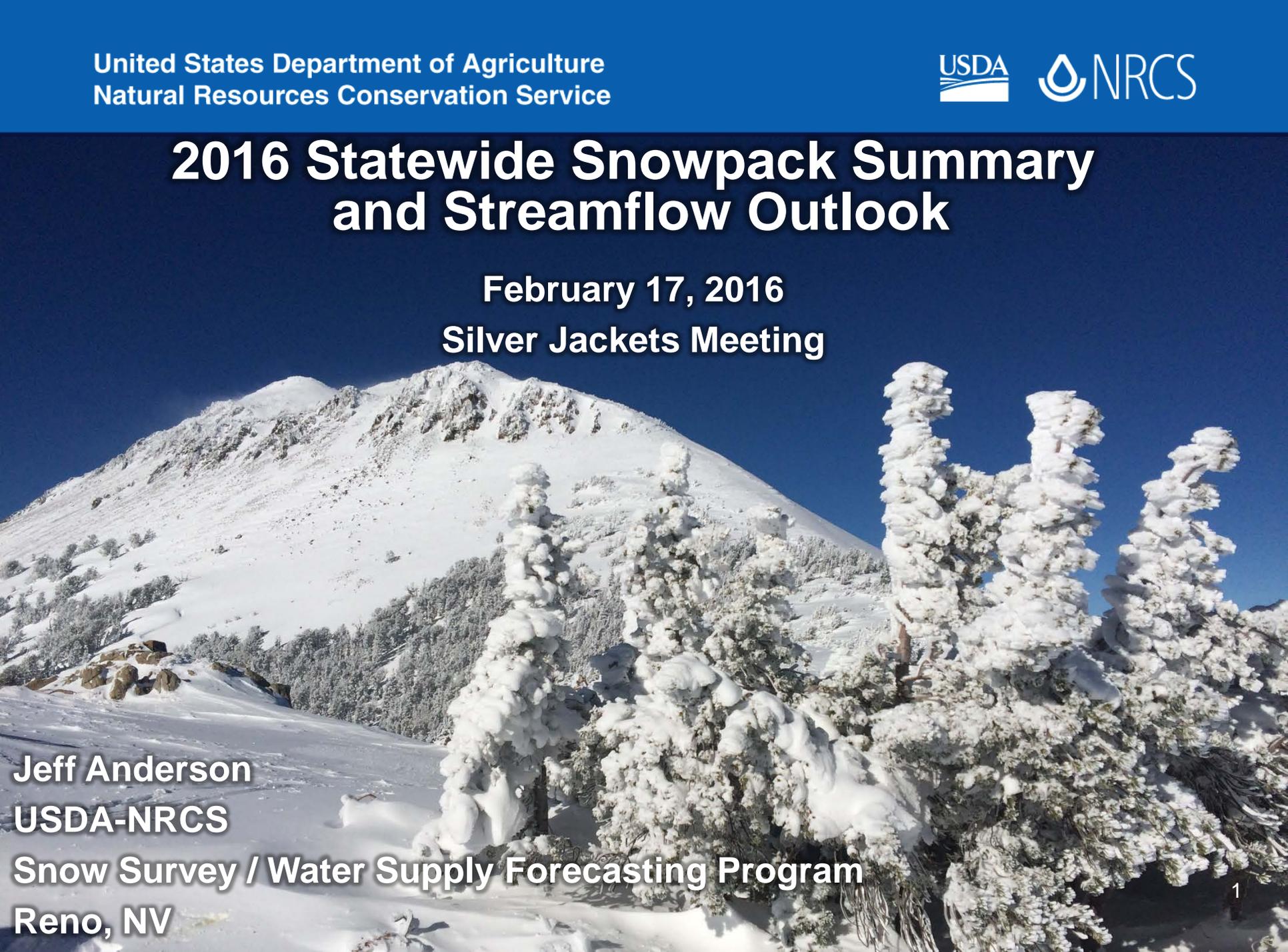


2016 Statewide Snowpack Summary and Streamflow Outlook

February 17, 2016
Silver Jackets Meeting

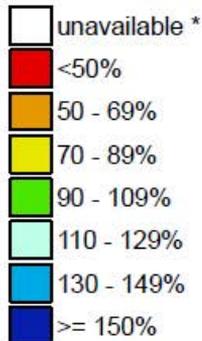


Jeff Anderson
USDA-NRCS
Snow Survey / Water Supply Forecasting Program
Reno, NV

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

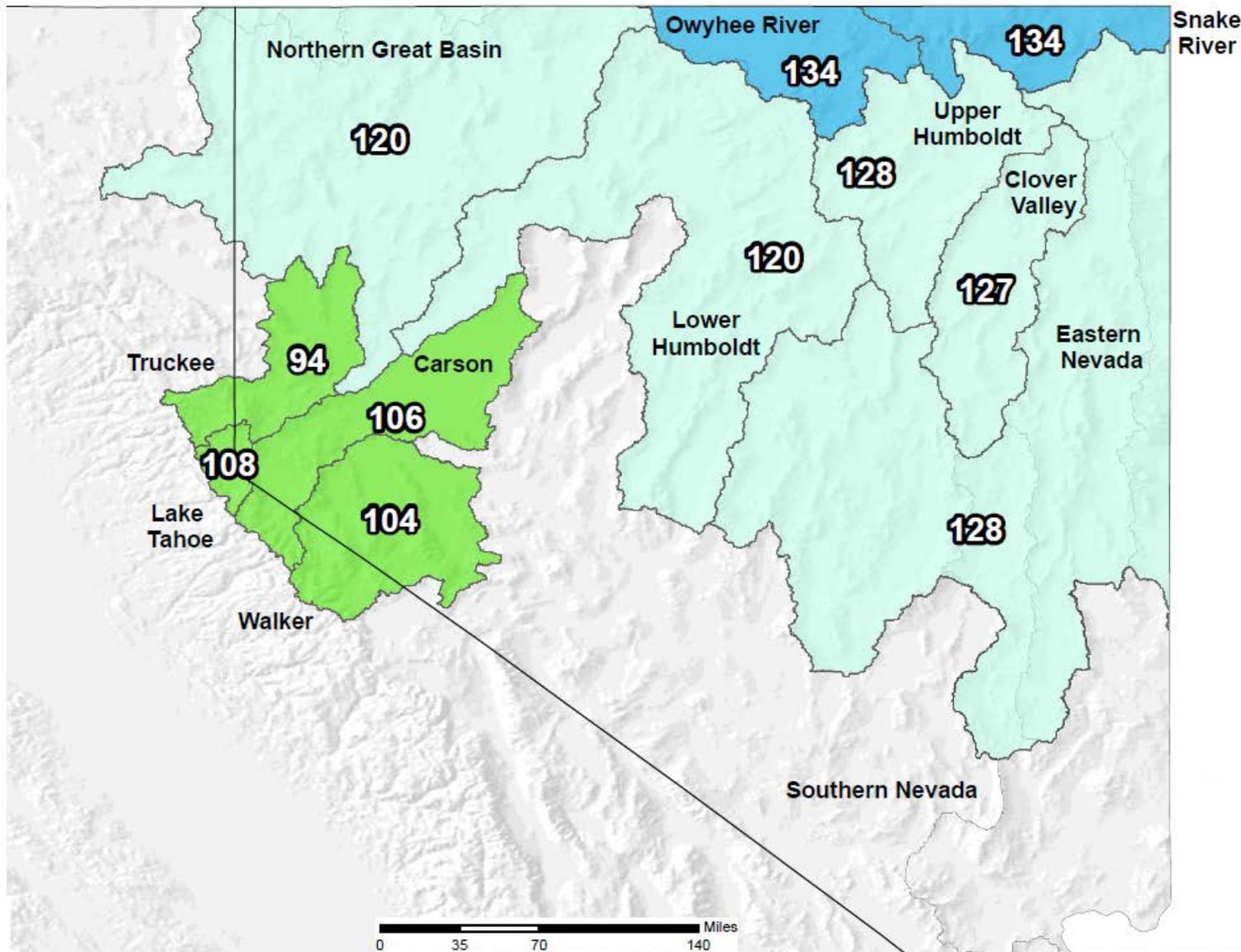
Feb 16, 2016

Current Snow Water Equivalent Basin-wide Percent of 1981-2010 Median



* Data unavailable at time of posting or measurement is not representative at this time of year

Provisional data subject to revision



Snow Water Equivalent (SWE) is a common snowpack measurement. It is the amount of **water** contained within the snowpack. It can be thought of as the depth of **water** that would theoretically result if you melted the entire snowpack instantaneously.

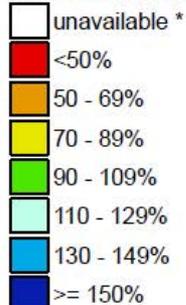
$$\text{Snow Depth (in)} * \text{Density} = \text{SWE (in)}$$



Nevada/California SNOTEL Water Year (Oct 1) to Date Precipitation % of Normal

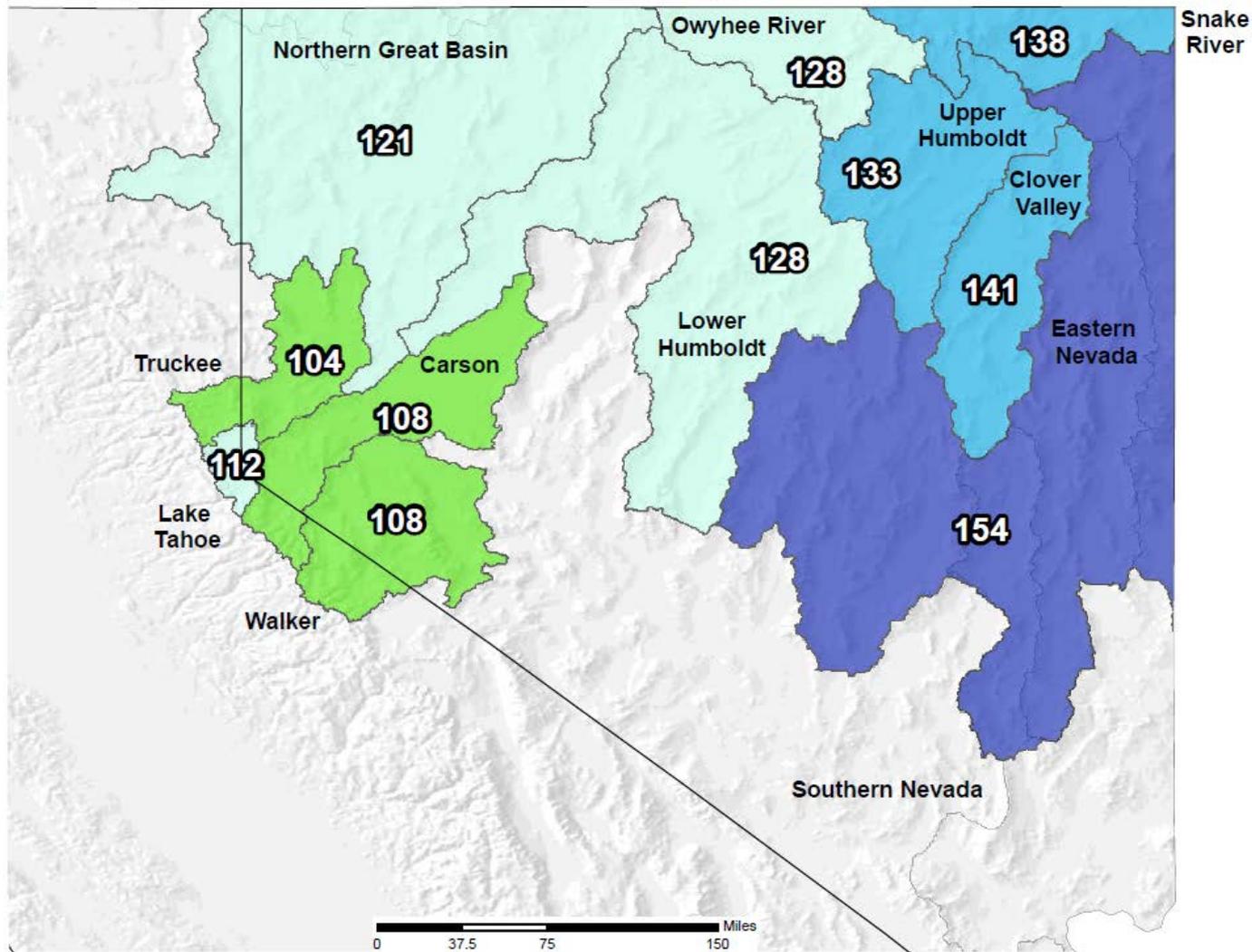
Feb 16, 2016

Water Year (Oct 1)
to Date Precipitation
Basin-wide Percent
of 1981-2010 Average



* Data unavailable
at time of posting
or measurement
is not representative
at this time of year

Provisional data
subject to revision

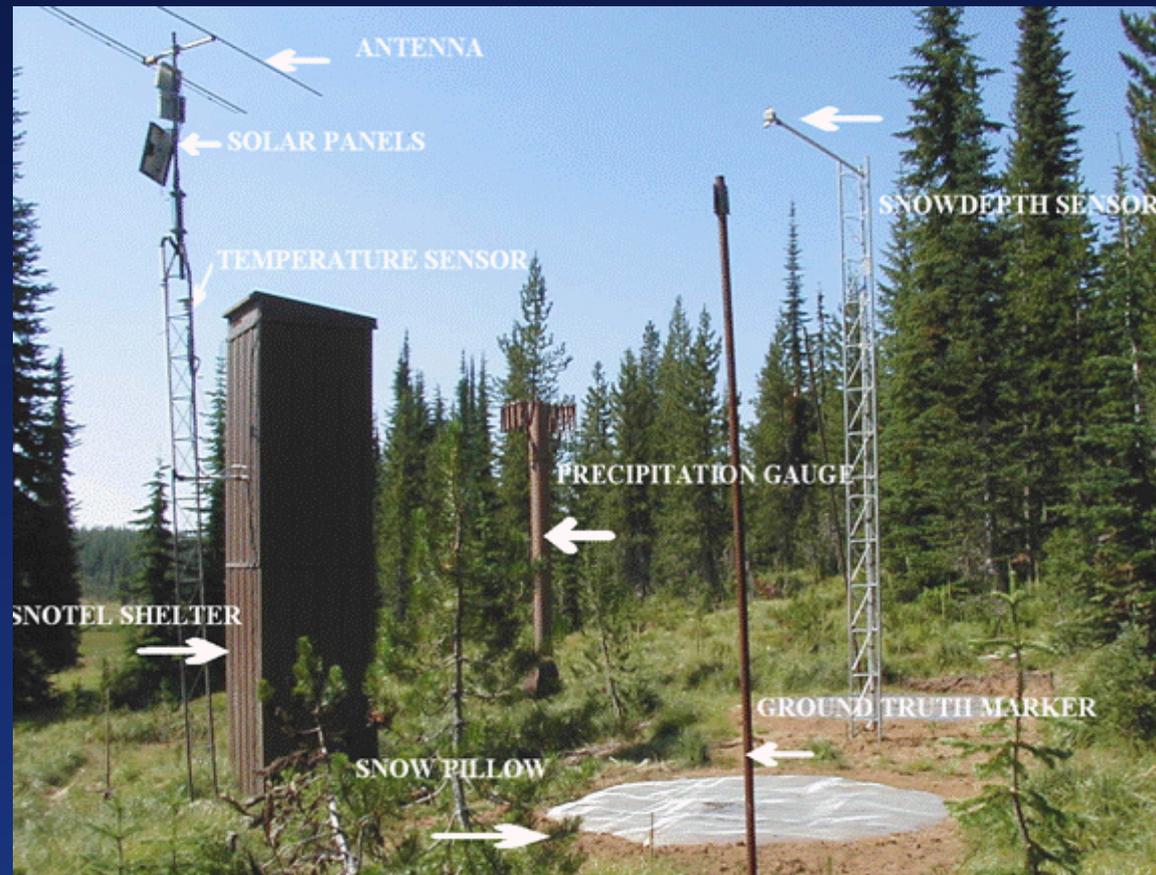


Monthly precipitation has been above normal each month October - January
February dry-spell looks to break the streak

What is a SNOTEL Site?

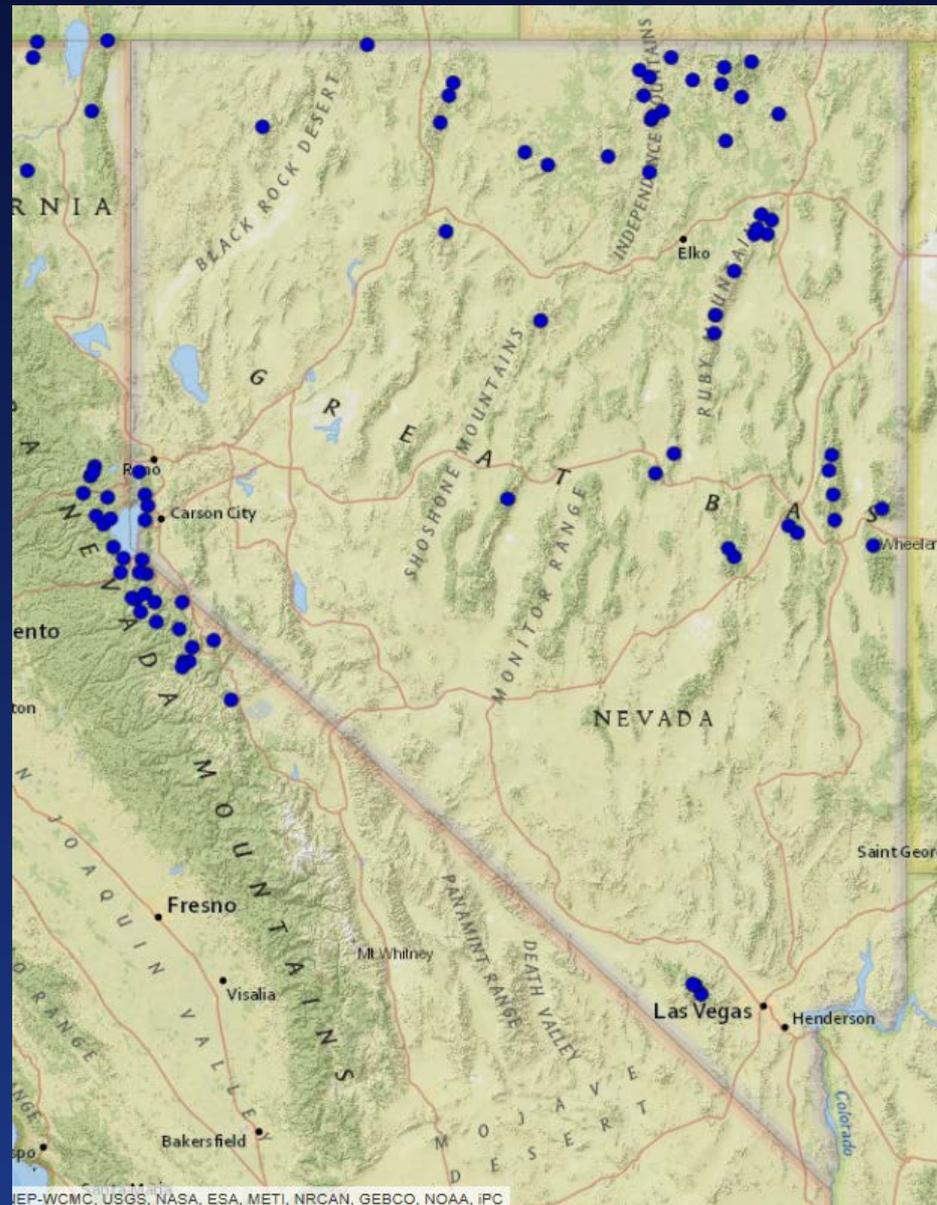
Automated Weather Station
that measures...

- SWE
- Cumulative precipitation
- Temperature
- Snow Depth
- Soil moisture / temperature
(2",8",20") +10yrs data

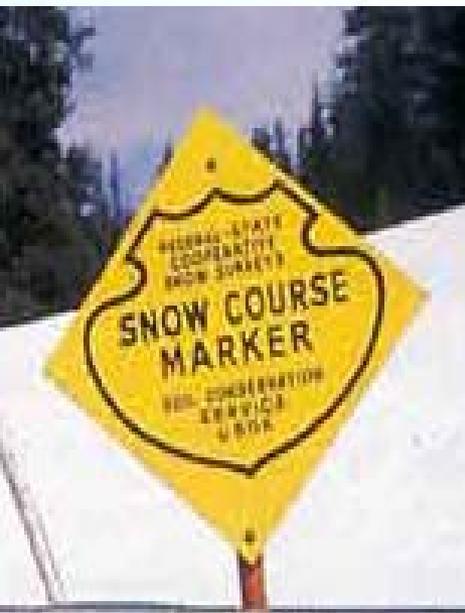


In Nevada &
Eastern Sierra
there are 81
SNOTEL
stations

43 have data
back to at
least 1981



Snow Courses



Permanently marked snow measuring locations.

Average of 5-10 points spaced at 50 ft

57 snow courses measured April 1 in NV and eastern Sierra

Natural Resources Conservation Service

Nevada Water Supply Outlook Report

February 1, 2016



Photo - 1/20/2016 Snow Surveyor Logan Jensen stands on the debris pile next to the toppled Hole-in-Mountain SNOTEL shelter

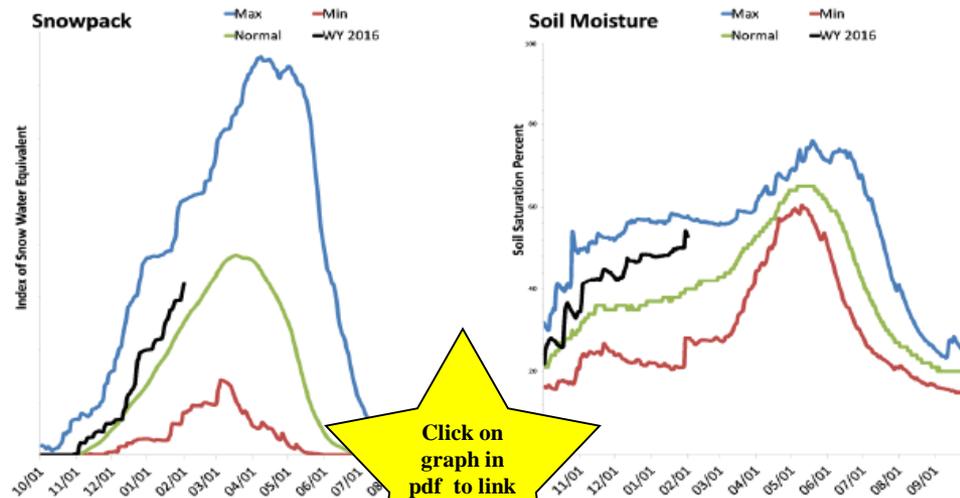
Hole-in-Mountain SNOTEL wiped out by avalanche!

Across Nevada the first half of winter is off to an incredible start. Statewide February 1 snowpack percentages are some of the highest in the West. To date the biggest series of storms this winter occurred between mid-December and Christmas. The snowpack more than doubled its water content during that period in the mountains near Elko. The new snow load proved too much for the slope above Hole-in-Mountain SNOTEL. At 7:00am on December 23, 2015 the site sent out a report indicating 28 inches of new snow in the last 72 hours. The 8:00am reading never arrived because an avalanche descended over 3,000 vertical feet, crossed one-third of a mile of flat ground, and leveled the weather station. The site's 12 foot tall shelter was swept 200 feet away. A similar incident occurred in February 1986 which resulted in moving the SNOTEL site further away from the mountain. For 30 years that move was far enough. This summer we'll try again and are working on permitting to re-install the site outside the debris zone of this avalanche. For the rest of this winter snow surveyors will make monthly visits to the site to manually measure the snow to provide water users in Clover Valley as much information as possible about this summer's water supply.

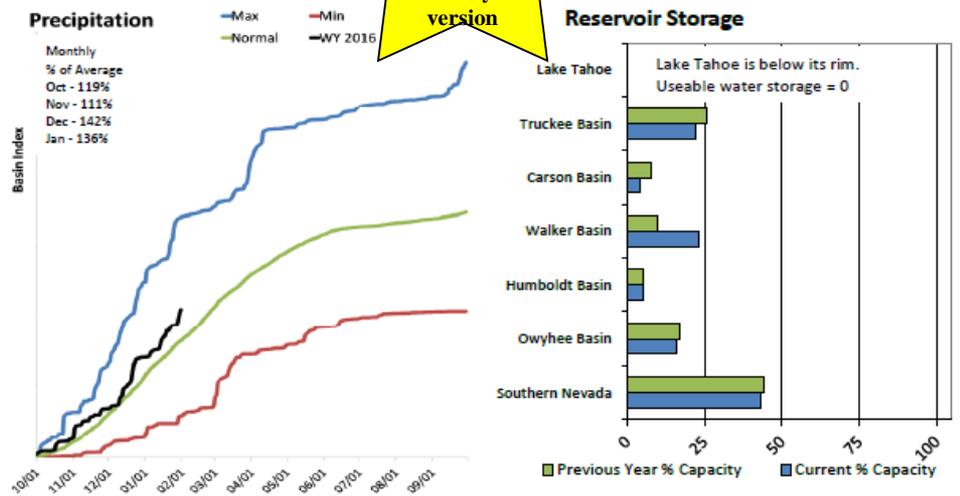
State of Nevada & Eastern Sierra

2/1/2016

The snowpack across Northern Nevada and the Eastern Sierra (Truckee, Tahoe, Carson and Walker basins) is much above normal at 133% of median, compared to 45% last year. Precipitation in January was much above average at 136%, which brings the seasonal accumulation (Oct-Jan) to 130% of average. Soil moisture is 53% compared to 45% last year. Reservoir storage ranges from 0% of useable capacity in Lake Tahoe to 43% of capacity in Southern Nevada.

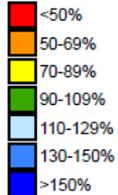


Click on graph in pdf to link to today's version

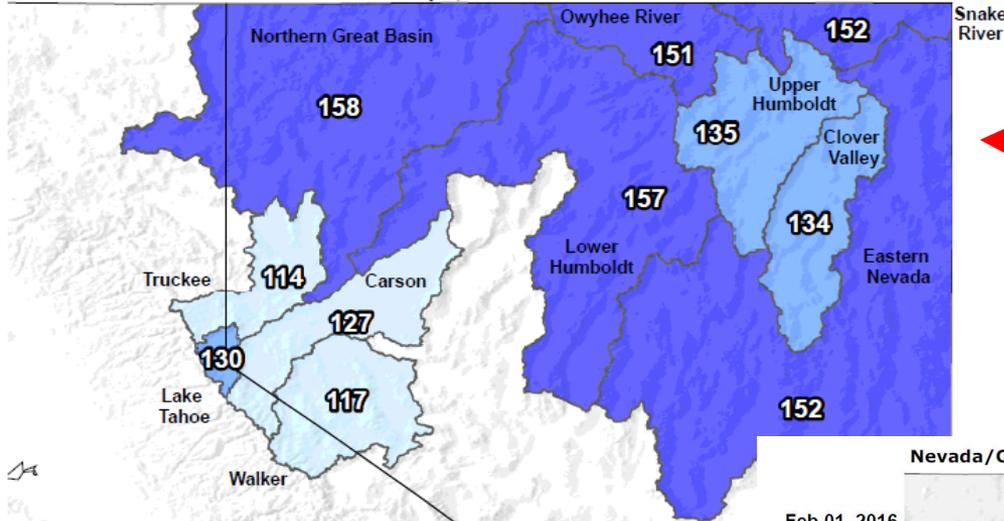


Nevada & Eastern Sierra
Percent of Median Snowpack
February 1, 2016

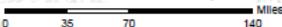
1st of Month Snow Water Equivalent Basin-wide Percent of 1981-2010 Median



Provisional data
subject to revision



Prepared by:
USDA/NRCS Nevada Snow Survey



Map data based on the first of month snow water equivalent found at selected SNOTEL and snow course basin compared to the median value for those sites. SNOTEL data based on the first reading of the day course data based on measurements taken within the last 5 days of preceding month. A table based of the underlying data can be found by selecting "Nevada" and report type "Snowpack" for the date list webpage: <http://www.wcc.nrcs.usda.gov/basin.html>.

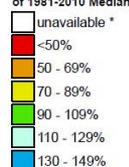
WSOR Monthly Map

Includes QC'd SNOTEL,
as well as,
Snow Course data

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

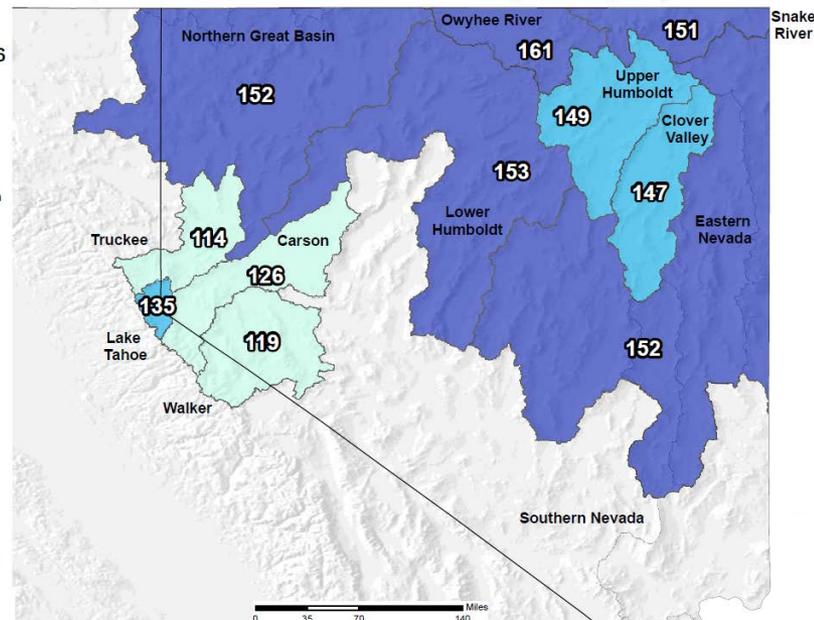
Feb 01, 2016

Current Snow Water Equivalent Basin-wide Percent of 1981-2010 Median



* Data unavailable at time of posting or measurement is not representative of this time of year

Provisional data
subject to revision



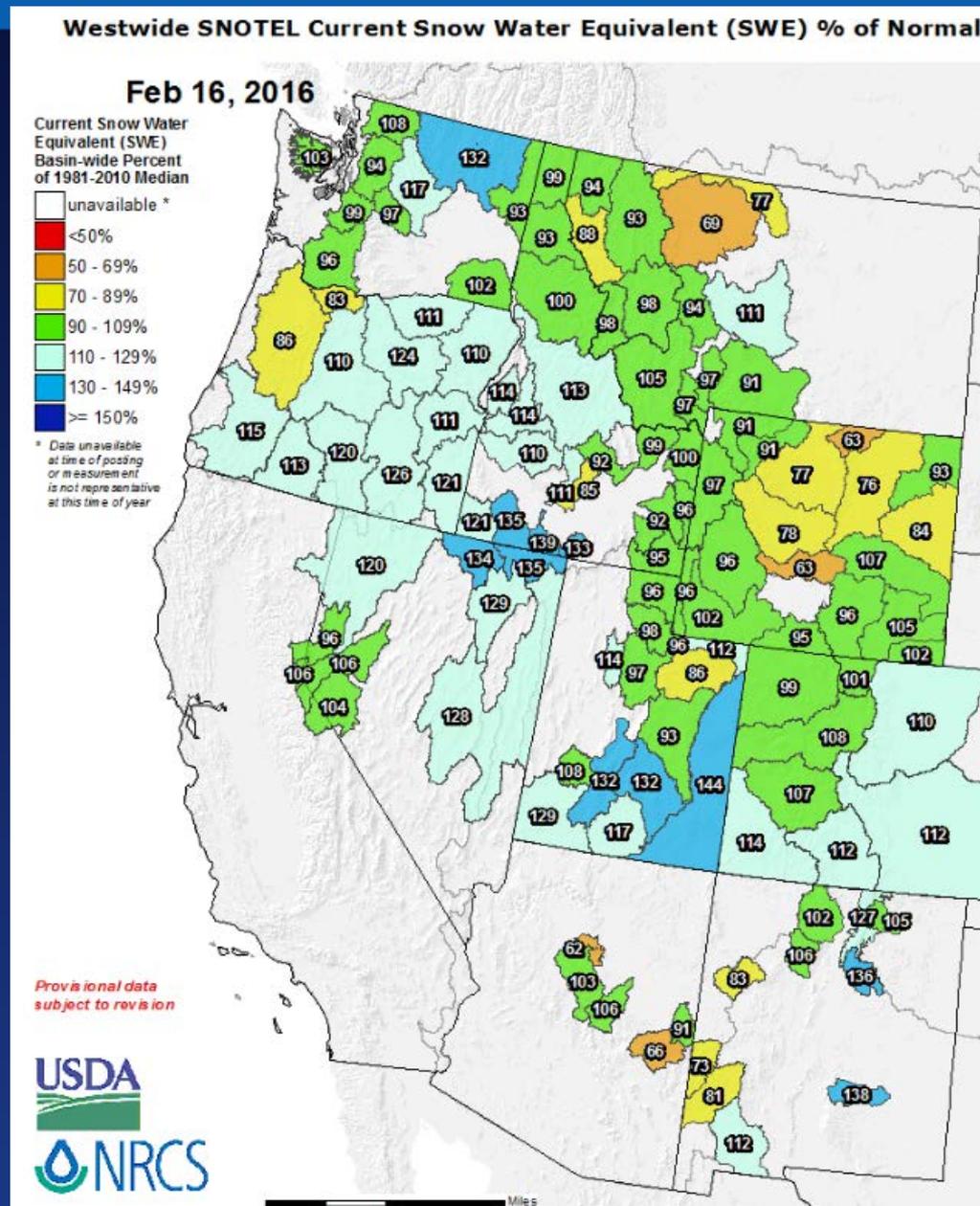
The current snow water equivalent percent of normal represents the snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).

Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
<http://www.wcc.nrcs.usda.gov>

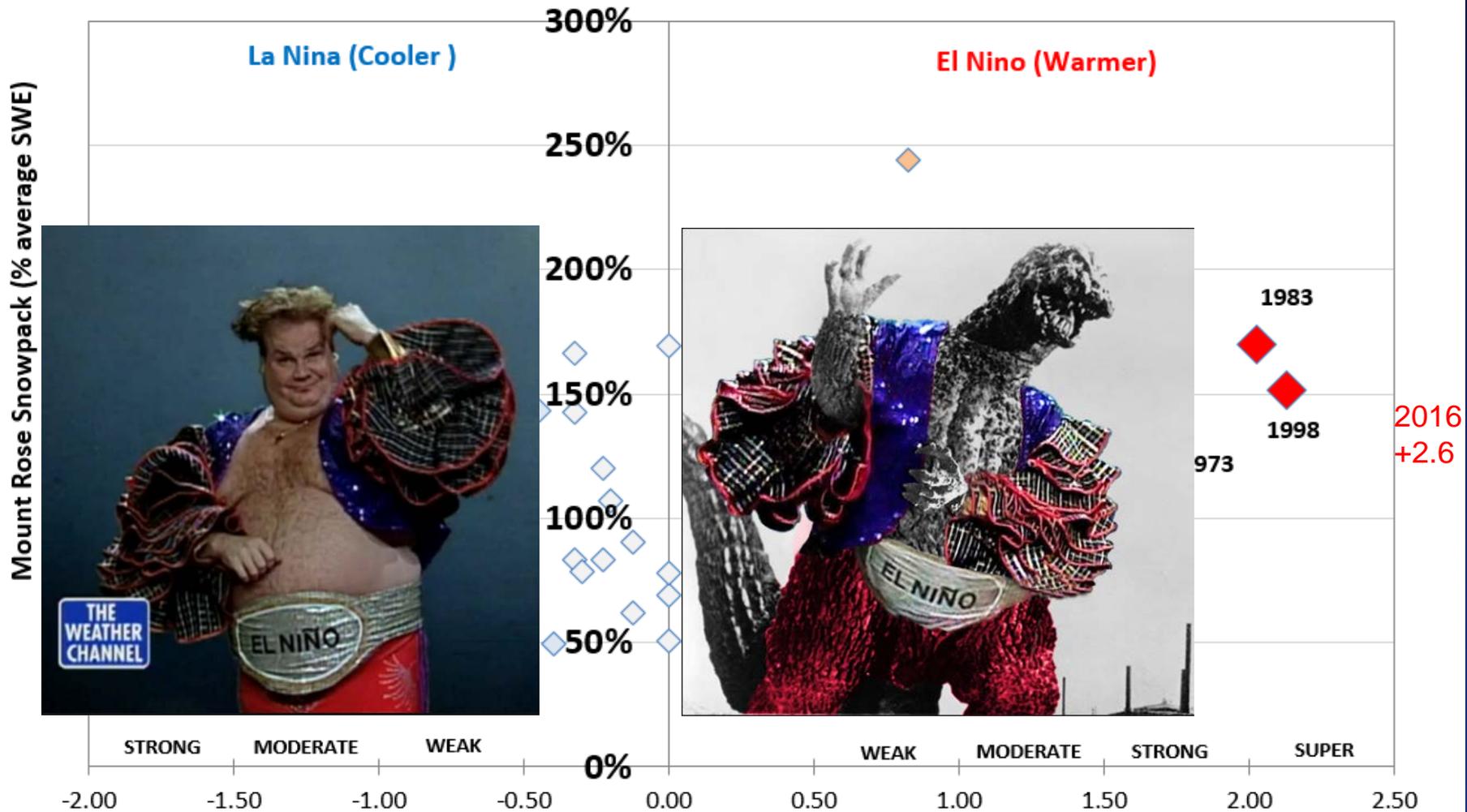
Daily Update Map

Includes SNOTEL only
Stations may be missing if a
site failed to report

Not a
typical
El Niño
Snowpack
Pattern

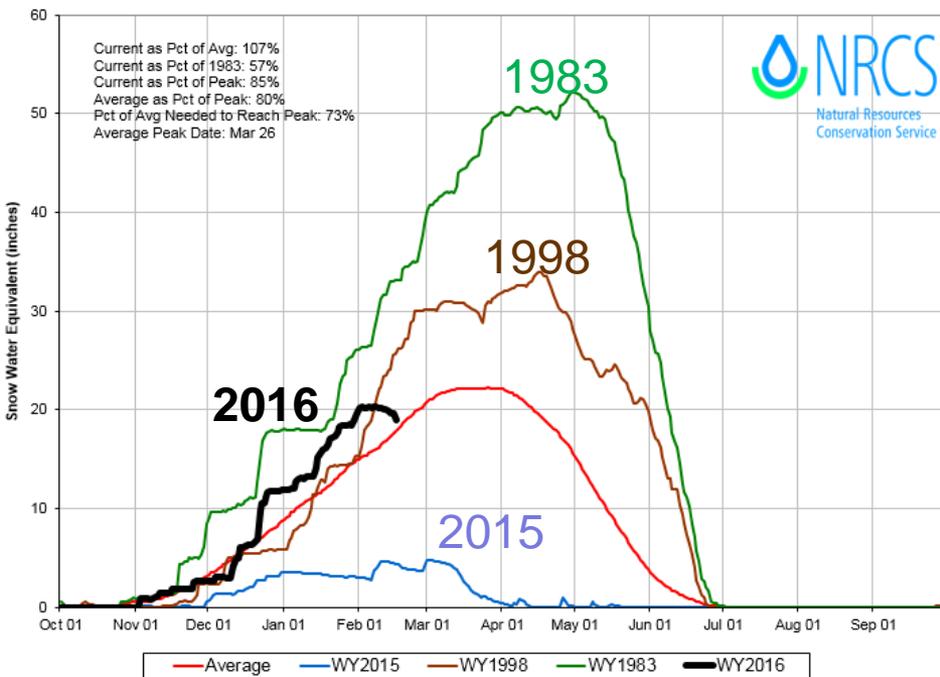


Sea Surface Temperature (SST) Anomalies vs. Mount Rose Snowpack (WY 1951-2015)

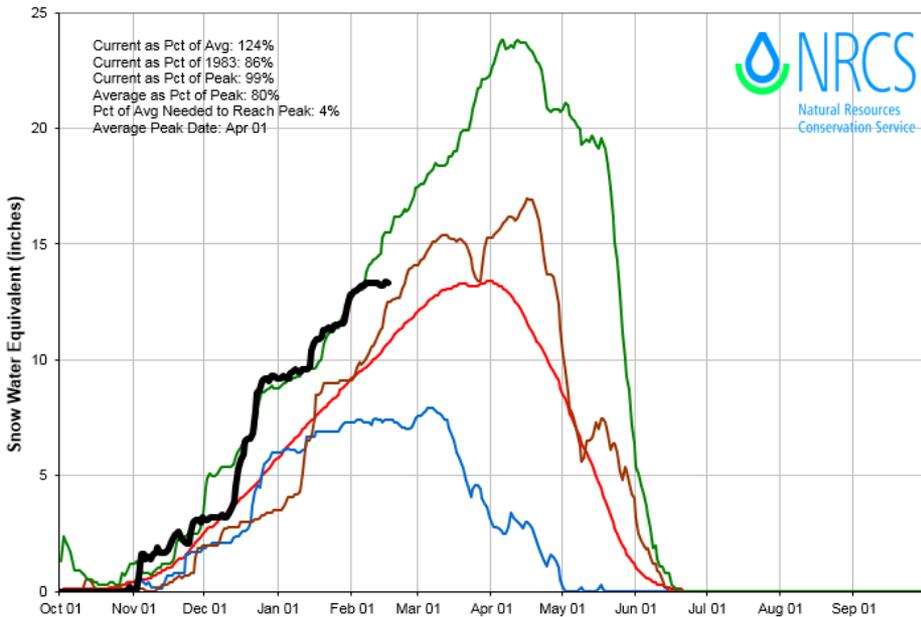


Oceanic Niño Index (ONI) 3 Month Running Mean of SST Anomalies in Niño 3.4 Region (°C)

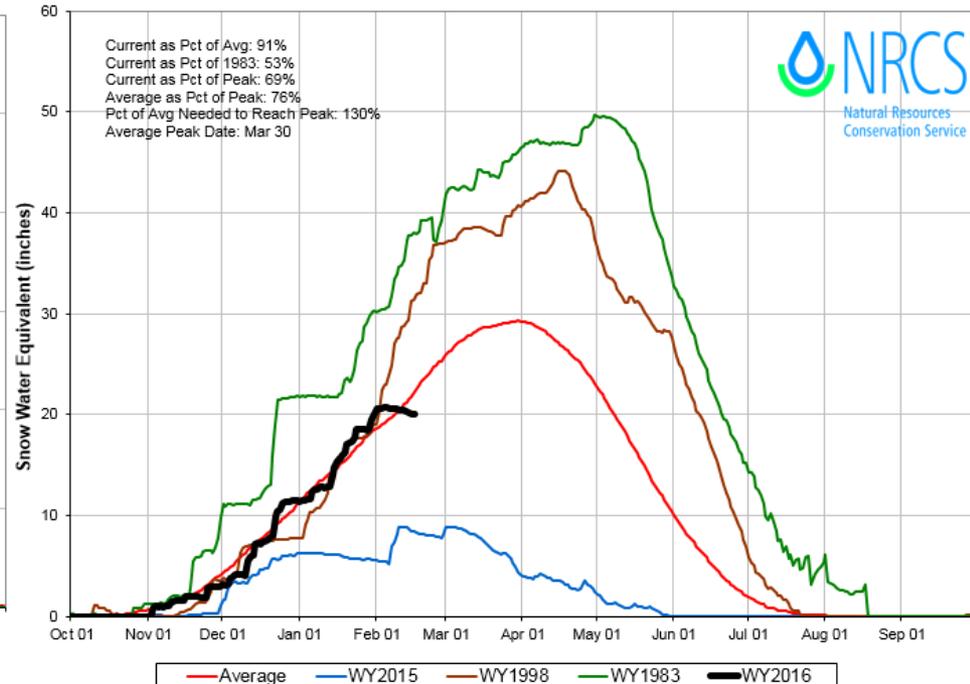
Lake Tahoe Basin Time Series Snowpack Summary
Based on Provisional SNOTEL data as of Feb 16, 2016



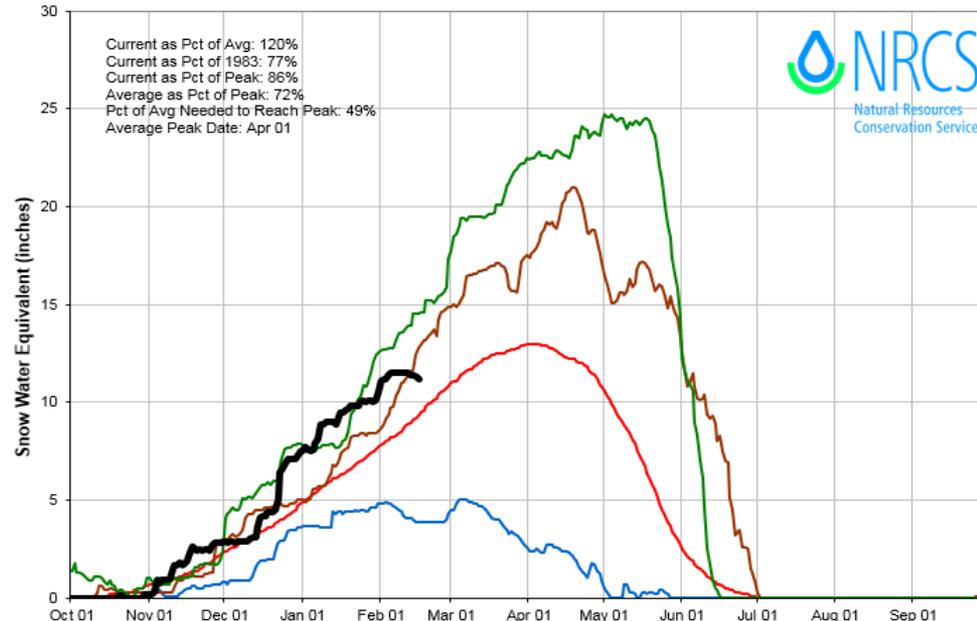
Upper Humboldt Basin above Palisade Time Series Snowpack Summary
Based on Provisional SNOTEL data as of Feb 16, 2016

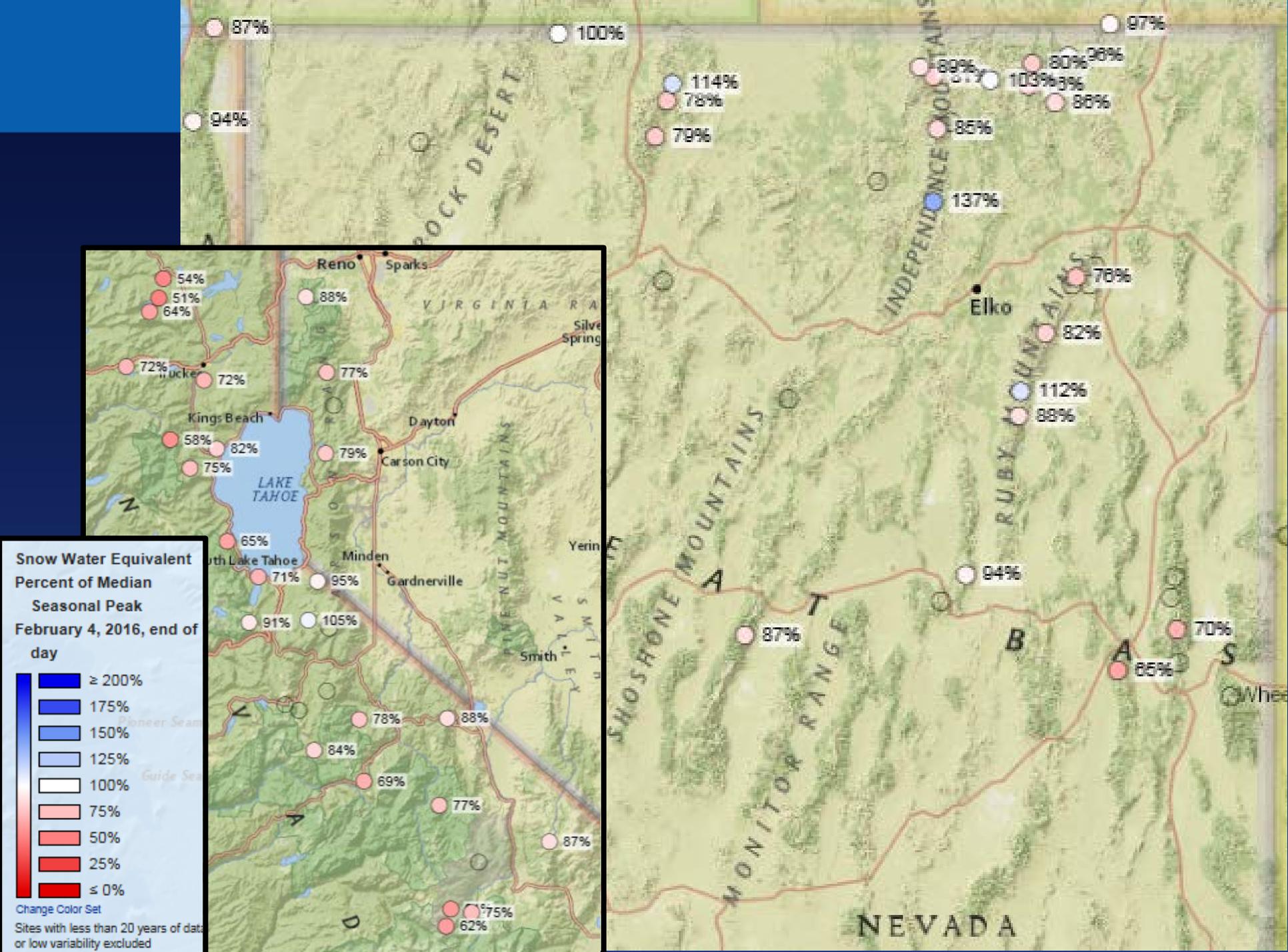


Truckee Basin Time Series Snowpack Summary
Based on Provisional SNOTEL data as of Feb 16, 2016



Eastern Nevada Time Series Snowpack Summary
Based on Provisional SNOTEL data as of Feb 16, 2016





PERCENT OF AVERAGE APRIL TO JULY STREAMFLOW
MOST PROBABLE FORECAST AS OF FEBRUARY 1 2016
(50 PERCENT CHANCE OF EXCEEDANCE)

BASIN	NRCS	NWS	
LAKE TAHOE INFLOW.....	99	101	
TRUCKEE RIVER.....	102	102	.. FARAD
CARSON RIVER	103	92	.. CARSON CITY
WEST WALKER RIVER	110	98	
EAST WALKER RIVER	110	90	
NORTHERN GREAT	95	NA	.. 4 SITE AVERAGE
UPPER HUMBOLDT RIVER	111	141	.. PALISADE
LOWER HUMBOLDT RIVER	90	143	.. IMLAY
CLOVER VALLEY AND FRANKLIN RIVER	103	NA	
SNAKE RIVER.....	153	90@	.. SALMON FALLS CK
OWYHEE RIVER	191	82@	
EASTERN NEVADA.....	122	NA	.. 4 SITE AVERAGE
LAKE POWELL INFLOW	98	94*	
SUSAN RIVER.....	NA	90	.. SUSANVILLE (WATER YEAR)
MIDDLE FORK FEATHER RIVER.....	NA	71	.. PORTOLA (WATER YEAR)

No longer coordinated
with NWS

NA - FORECAST EITHER NOT AVAILABLE OR NOT PRODUCED FOR THIS LOCATION
AT THE TIME OF THE REPORT

* - LAKE POWELL INFLOW NWS FORECAST PROVIDED BY CBRFC IN SALT LAKE CITY

@ - SNAKE AND OWYHEE RIVER NWS FORECASTS PRODUCED BY NWRFC IN
PORTLAND

Feb 1, 2016 Forecast

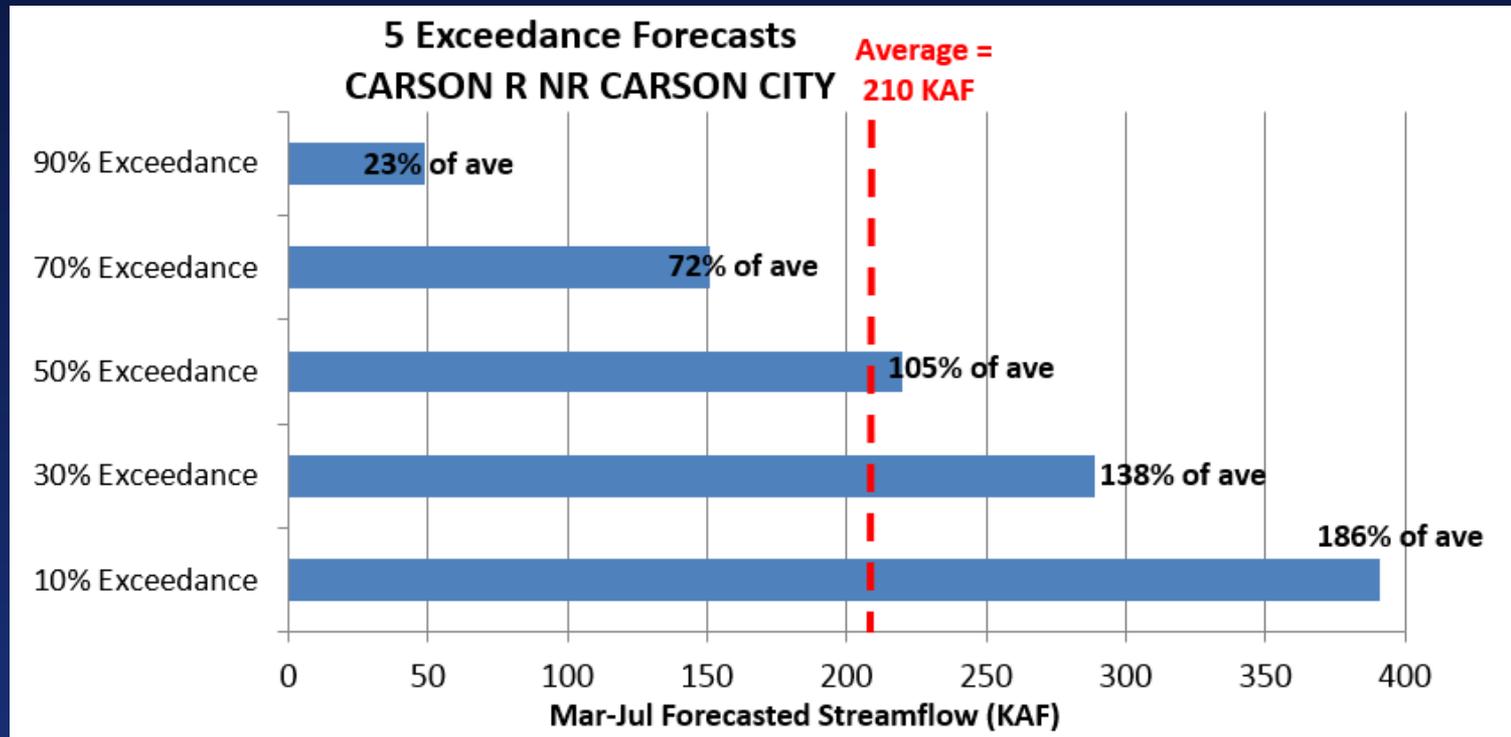
Drier than
Normal
Future

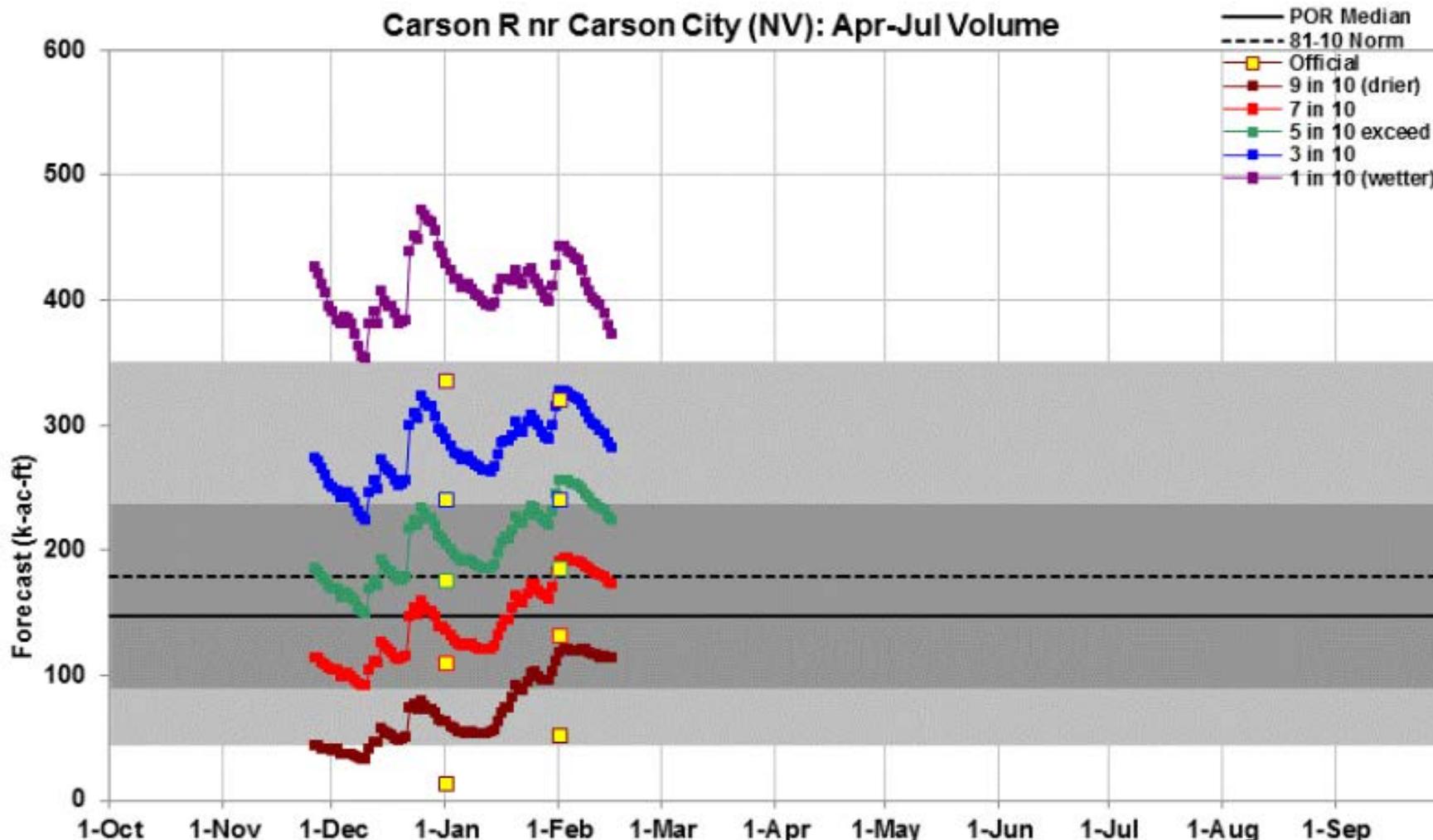


Normal Future
Precip



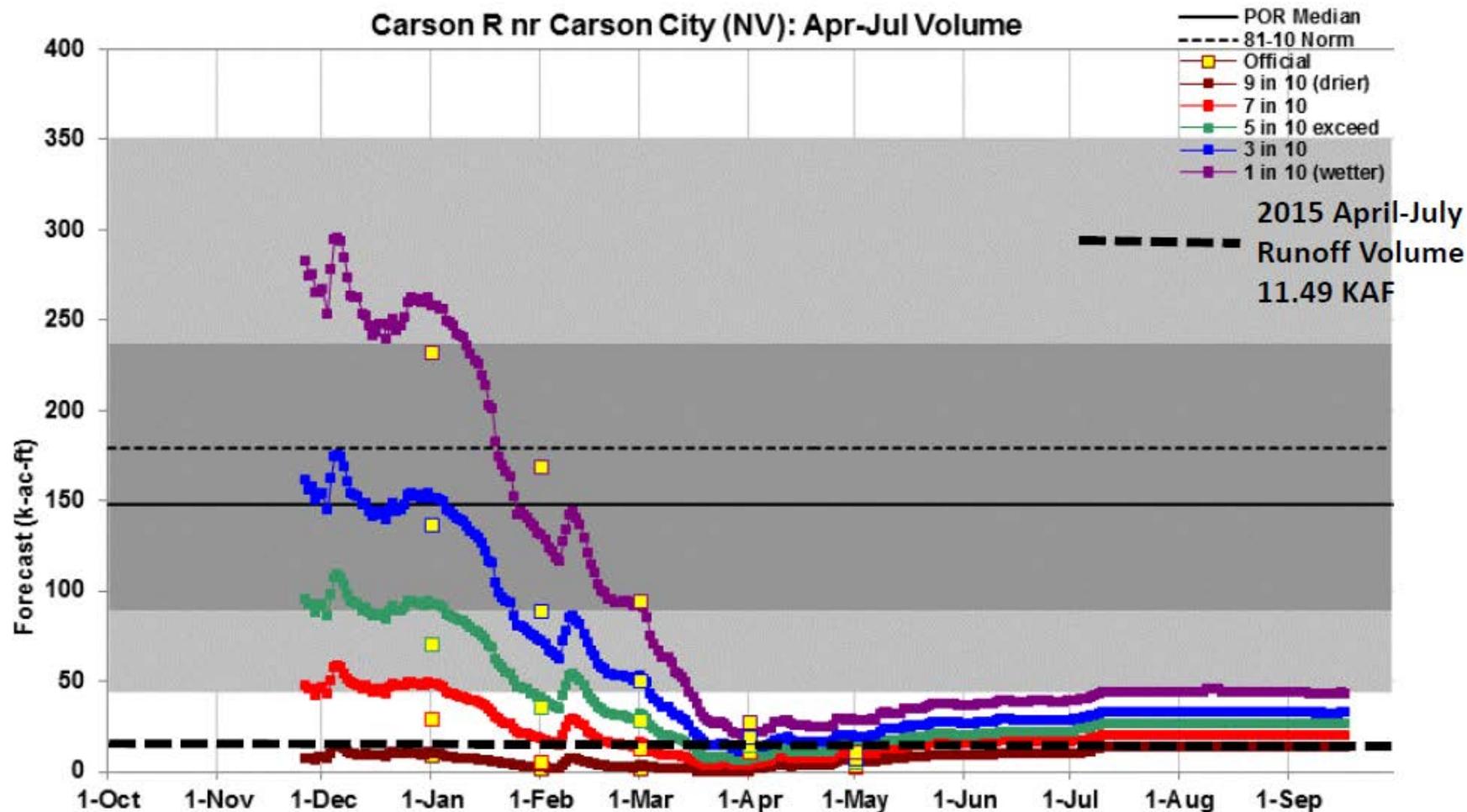
Wetter than
Normal
Future





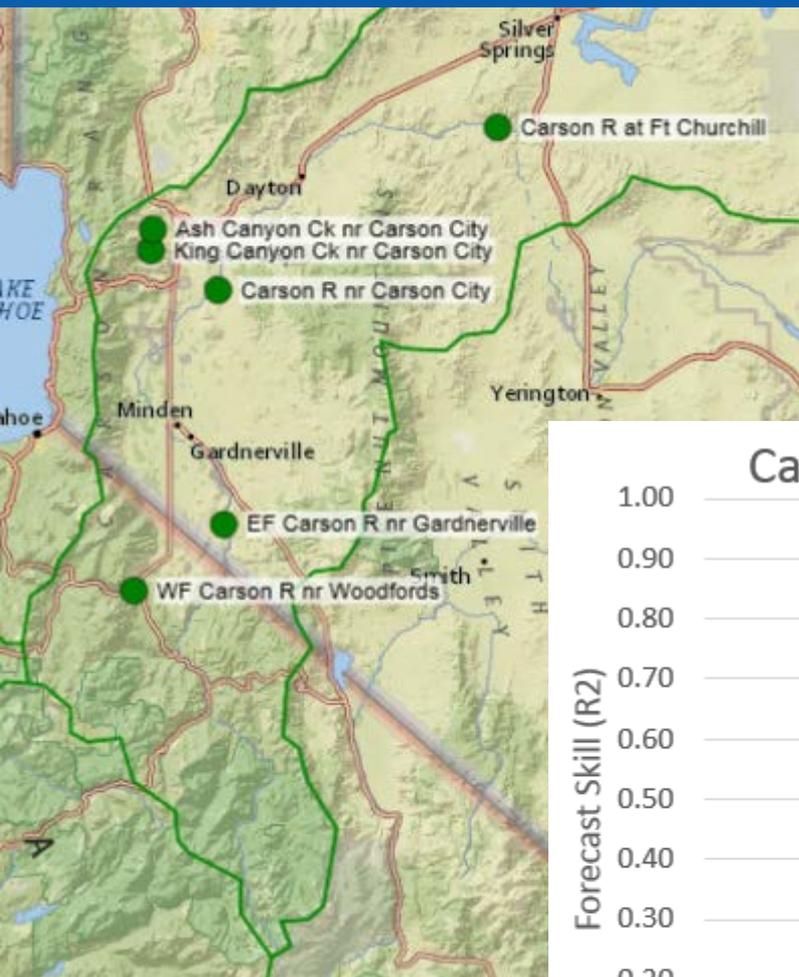
This is an automated product based solely on SNOTEL data, provisional data are subject to change. This product is a statistically based guidance forecast combining indices of snowpack and precipitation. **Yellow squares** are the official outlooks. **Gray background** is the historical period of record 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/wws/daily_forecasts.html

Created 7:24 Feb 16 2016

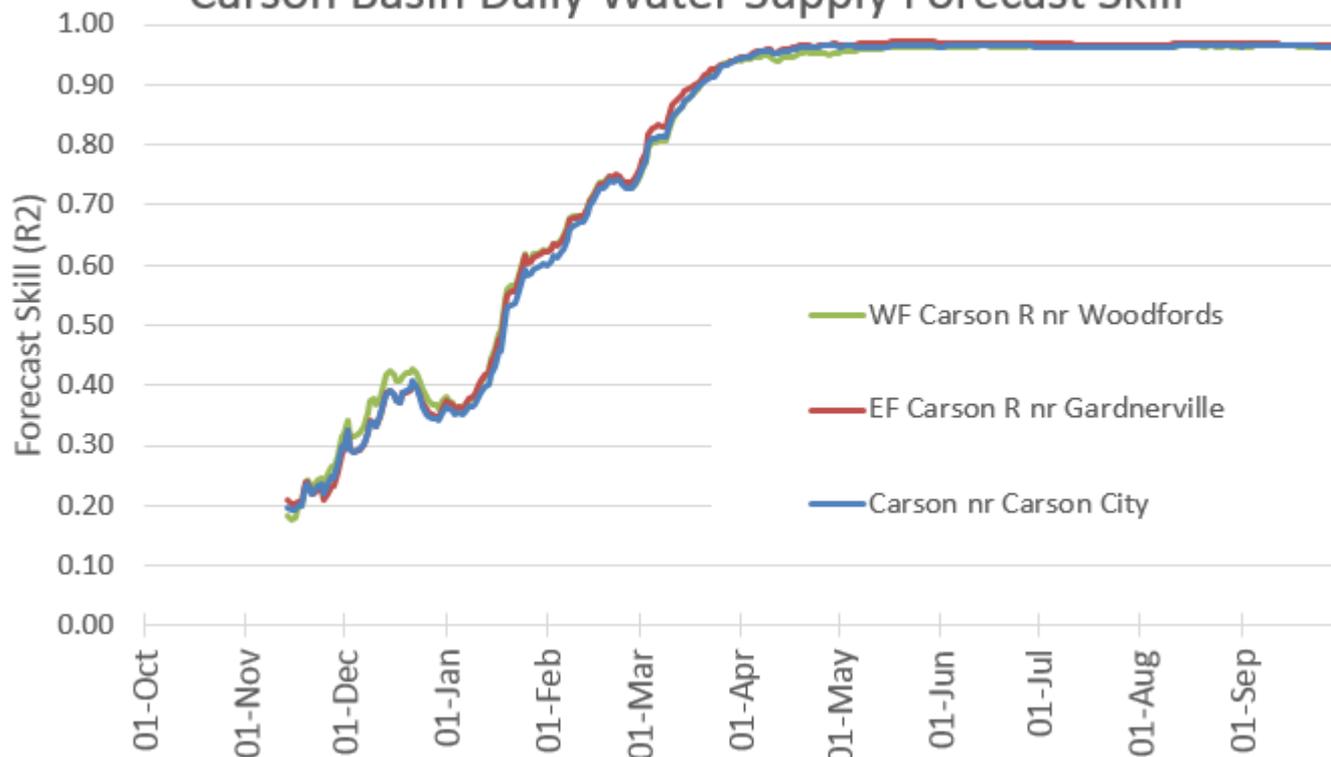


This is an automated product based solely on SNOTEL data, provisional data are subject to change. This product is a statistically based guidance forecast combining indices of snowpack and precipitation. **Yellow squares** are the official outlooks. **Gray background** is the historical period of record 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

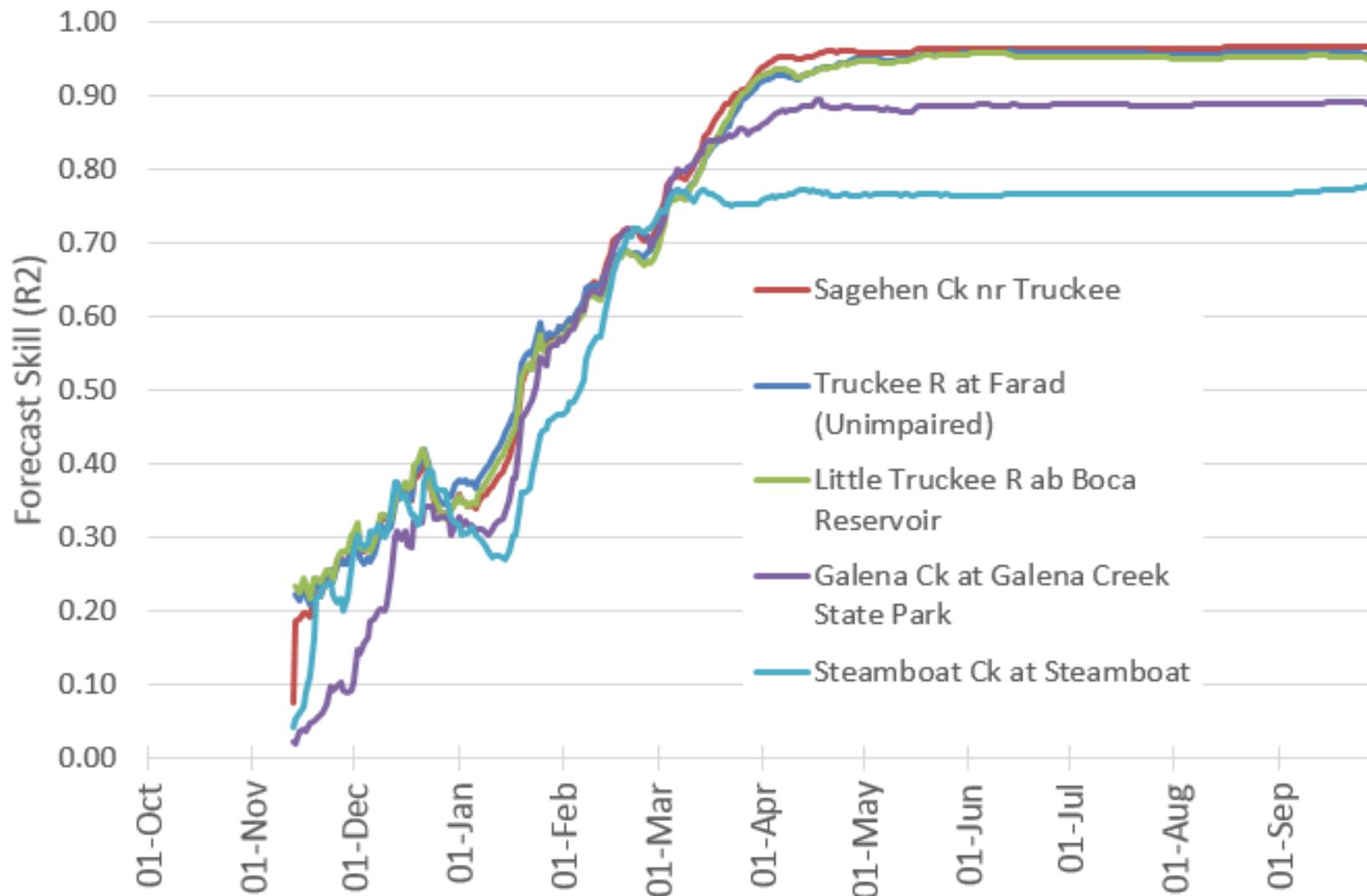
Created 6:57 Sep 17 2015

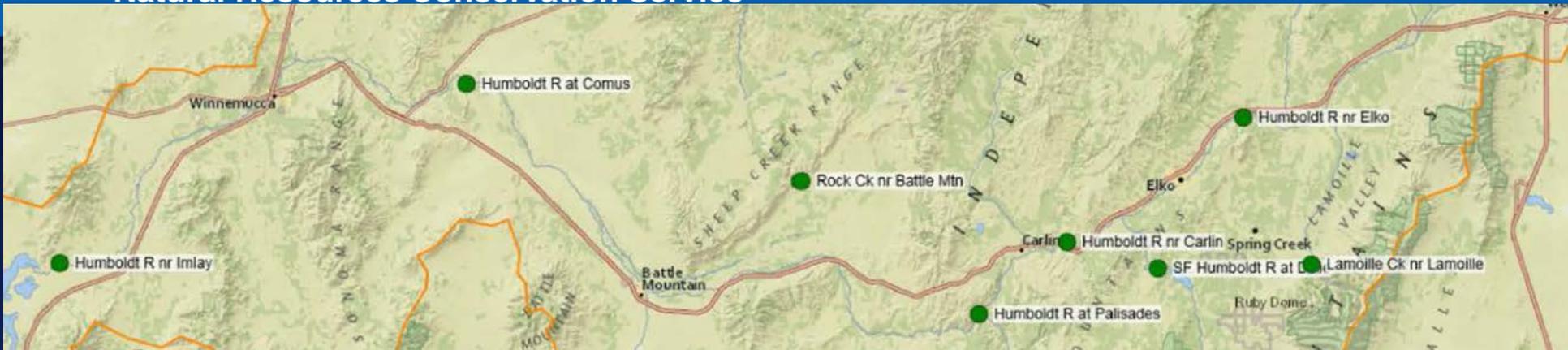


Carson Basin Daily Water Supply Forecast Skill

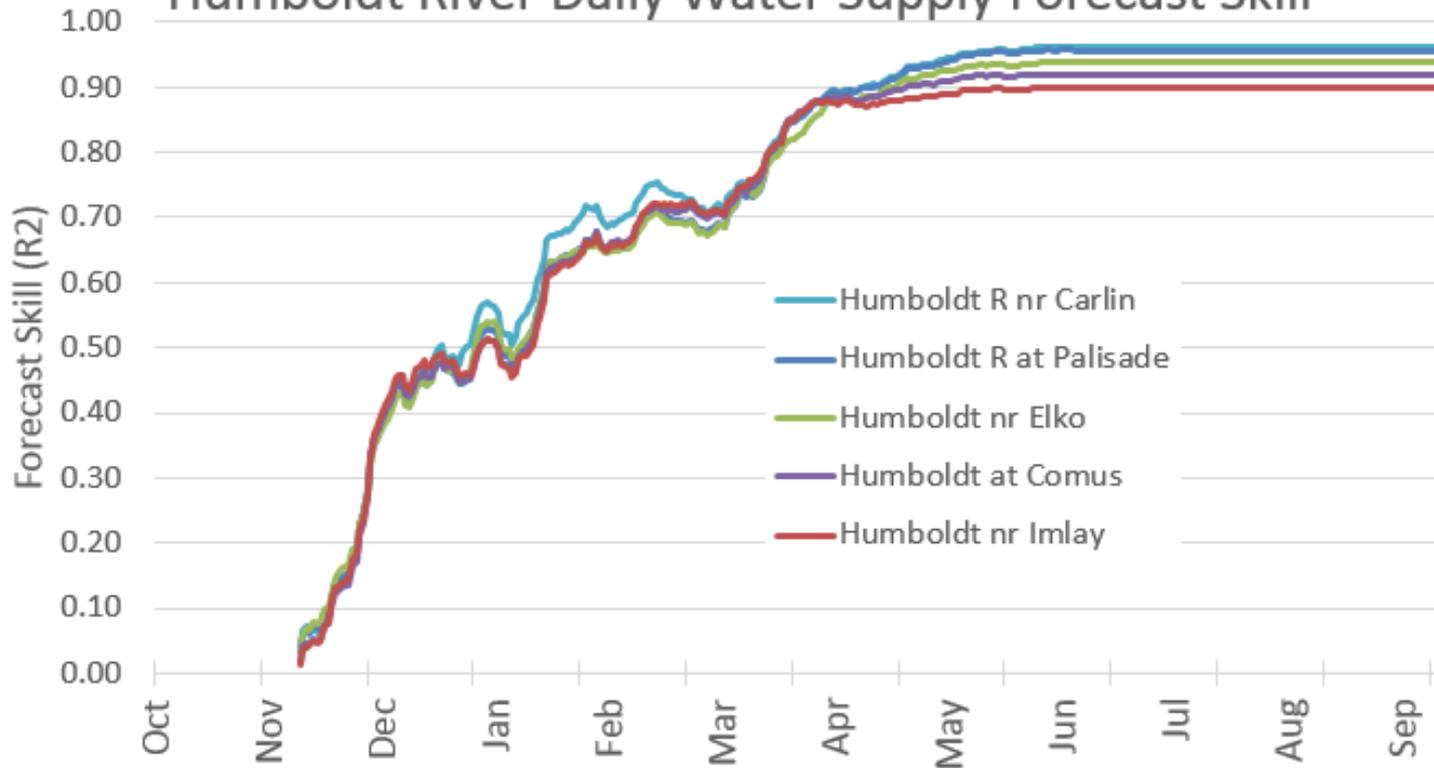


Truckee Basin Daily Water Supply Forecast Skill





Humboldt River Daily Water Supply Forecast Skill



USDA Natural Resources Conservation Service Nevada
United States Department of Agriculture

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- Snow Survey Products
- Water Supply Products

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Snow Survey

Nevada NRCS Snow Survey Program

Latest Snow & Water Supply Information:

- February 1, 2016 Water Supply Outlook Report- **NEW!**
- 2015 Streamflow Forecast vs Actual Runoff Review- **NEW!**
- Weekly El Niño Status Update (from NOAA)

Today's Snow & Precipitation 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

Snow Survey Data

- Site Pages:
- Interactive Map: (zoom, click site for data) SNOTEL | Snow Course | SCAN
- Interactive Map Conditions Links - **NEW!**
- Current and Historic Data Reports
- 30 Year Normals
- Metadata: Location | Site Photos

Water Supply Information

- Outlook Reports:
- Streamflow Forecasts:
- Streamflow Forecast Maps: NV | West US
- Daily Streamflow Forecasts - **NEW!**
- Monthly Reservoir Report (select reservoir)
- USGS Conditions: Stream | Reservoir
- Past Water Supply Presentations

Snow Survey Products

- SNOTEL Snow & Precip Update Reports
- Monthly Basin Data Reports
- Snowpack Graphs: SNOTEL | Basin
- Daily Map Products: Snow | Prec | Temp

Climate and Drought Information

- NRCS Weekly Water & Climate Report
- Climate Links: (PRISM, AgACIS, Wind data)
- Nevada Climate Summaries (by county)
- Great Basin Weather & Climate Dashboard
- US Drought Monitor: Nevada | West



% normal reports & maps

Google-like map



Streamflow forecasts

Snowpack graphs



Summary

- 2016 Snowpack still near median despite dry-spell
- West-wide snowpack not following El Niño pattern.
- Similar El Niño years of 1983 and 1998 both ended up above normal, this year's snow was similar or better than 1998 before dry spell. Now we'll need a big March to match it.
- February is first month this water year will below average precipitation.
- Most Feb 1 streamflow forecasts (50% exceedance) are 85-125% of average.
- Forecast skill is still improving at this time of year and bounds on forecast (10% and 90% forecasts) cover wide range.
- Some forecasts have greater skill than others, but all get better as the months pass. Stay tuned...

Jeff.Anderson@nv.usda.gov

775-857-8500 x 152

