2016 Snowpack Status and Streamflow Outlook for the Truckee, Carson, Walker, and Humboldt River Drainages

January 19, 2016

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USDA-NRCS
Snow Survey / Water Supply Forecasting Program
Reno, NV
Nevada/California SNOTEL Current Snow Water Equivalent (SWE) % of Normal

Jan 19, 2016

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
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 NV & East Sierra there are 81 stations & 43 sites have data back to 1981
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.

Snow Depth (in) * Density = SWE (in)
Welcome Back Old Man Winter!

That old curmudgeon finally remembered Northern Nevada's area code. This winter's snowpack is off to a great start with up to twice normal amounts across parts of the state. Near weekly storms from November through December allowed avid skiers and snowboarders to log more powder days than during all of last season. Hopefully El Niño fueled storms push north and bring more snow to our area over the next three months to put a dent in drought deficits.

Photo: Mt Rose Ski Tahoe – Chair Chair – December 24, 2015

The snowpack across Northern Nevada and the Eastern Sierra (Truckee, Tahoe, Carson, and Walker basins) is much above normal at 154% of median, compared to 80% last year. Precipitation in December was much above average at 162%, which brings the seasonal accumulation (Oct-Dec) to 137% of average. Soil moisture is 49% compared to 54% last year. Reservoir storage ranges from 0% of useable capacity in Lake Tahoe to 42% of capacity in Southern Nevada.
WSOR Monthly Map
Includes QC’d SNOTEL, as well as, Snow Course data

Daily Update Map
Includes SNOTEL only
Some stations may be missing
Or just Google…

“Nevada NRCS Snow Survey”

www.nv.nrcs.usda.gov/snow/
Typical El Niño Pattern Developing
Nevada/California SNOTEL Water Year (Oct 1) to Date Precipitation % of Normal

Jan 19, 2016

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

- unavailable *
- <50%
- 50 - 69%
- 70 - 89%
- 90 - 109%
- 110 - 129%
- 130 - 149%
- >= 150%

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

Provisional data subject to revision

The water year to date precipitation percent of normal represents the accumulated precipitation 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).

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Mt Rose SNOTEL Precipitation Accumulation WY 2012-2015

Average Annual Prec = 54.9 in
Missed Prec 2012-2015 = 74 in

2016 Prec to date is 112% and +2 inches

1.3 year Missed Prec

1 year Missed Prec

Updated 1/15/16
# Missed Precipitation Water Years 2012-2015

### Table of Stations and Basins

<table>
<thead>
<tr>
<th>Station Name</th>
<th>Basin</th>
<th>2012-2015 Prec Missed</th>
<th>Years Prec Missed</th>
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</thead>
<tbody>
<tr>
<td>Sonora Pass</td>
<td>Walker</td>
<td>56.3</td>
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<td>Blue Lakes</td>
<td>Carson</td>
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<td>Truckee</td>
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<td>Poison Flat</td>
<td>Carson</td>
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<td>Virginia Lakes Ridge</td>
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<td>Rubicon #2</td>
<td>Tahoe</td>
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<td>Squaw Valley G.C.</td>
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<td>1.4</td>
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<td>Mt Rose Ski Area</td>
<td>Truckee</td>
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<td>Leavitt Lake</td>
<td>Walker</td>
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<td>Black Rock Desert</td>
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<td>1.1</td>
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<td>Independence Lake</td>
<td>Truckee</td>
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<td>Lewis Peak</td>
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<td>Humboldt</td>
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<td>Heavenly Valley</td>
<td>Tahoe</td>
<td>32.5</td>
<td>1.0</td>
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### Basin Table

<table>
<thead>
<tr>
<th>Basin</th>
<th># Sites</th>
<th>Average # Years Missed Prec</th>
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<tbody>
<tr>
<td>Truckee</td>
<td>8</td>
<td>1.3</td>
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<tr>
<td>Carson</td>
<td>9</td>
<td>1.3</td>
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<tr>
<td>Walker</td>
<td>6</td>
<td>1.2</td>
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<tr>
<td>Tahoe</td>
<td>7</td>
<td>1.1</td>
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<tr>
<td>Humboldt</td>
<td>10</td>
<td>0.7</td>
</tr>
<tr>
<td>Eastern Nevada</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Snake - Owyhee, Burneo, Salmon Falls</td>
<td>9</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Lake Tahoe Basin Time Series Snowpack Summary
Based on Provisional SNOTEL data as of Jan 19, 2016

Current as Pct of Avg: 134%
Current as Pct of 2013: 122%
Current as Pct of Peak: 73%
Average as Pct of Peak: 55%
Pct of Avg Needed to Reach Peak: 59%
Average Peak Date: Mar 26
Monthly SNOTEL Precipitation as % Average

January 2015  
January 1-18, 2016
Since 2000 there have been 10 years with <100% January precipitation which led to <100% Water year precipitation.

January 2016 is 115% for 1-18th 69% of monthly Average
El Niño Strength

1997-98 vs 2015-2016
Sea Surface Temperature (SST) Anomalies vs. Mount Rose Snowpack (WY 1951-2015)

Graph courtesy of Bill Hauck, Truckee Meadows Water Authority

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

Graphic courtesy of Bill Hauck, Truckee Meadows Water Authority
Hole-in-Mountain SNOTEL, Nevada hit by Avalanche!

Site stopped reporting 12/23 at 7:00
Site had received 28” in previous 72 hours
Repeat of 1983 incident

The whole cirque slid
Summer
Snow pillow & fence appear to be ok, avalanche went over the top on existing snow

No sign of 10ft tall precip gage or 20ft tall tower
Red Flag Warning of recent avy activity?
Antenna wrapped around aspen
Jan 1 Streamflow Forecasts - 50% Exceedance - March to July Period

- **Truckee Basin**
  - Average 94%
  - Jan 19 Forecast

- **Carson Basin**
  - Average 103%

- **Walker Basin**
  - Average 108%

- **Upper Humboldt Basin**
  - Average 118%

- **Lower Humboldt Basin**
  - Average 111%
Drier than Normal Future

Normal Future Precip

Wetter than Normal Future

United States Department of Agriculture
Natural Resources Conservation Service

5 Exceedance Forecasts
CARSON R NR CARSON CITY

Average = 210 KAF

90% Exceedance 9% of ave

70% Exceedance 63% of ave

50% Exceedance 100% of ave

30% Exceedance 136% of ave

10% Exceedance 190% of ave

Mar-Jul Forecasted Streamflow (KAF)
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 supersede the official forecasts produced in coordination with the National Weather Service.
Science Contact: Cara.s.McCarthy@por.usda.gov wwwwcc.nrcs.usda.gov/wsf/daily_forecasts.html
Forecast Skill

- Ideas lump skill traces from dwsf on single plot for farad, carson, Humboldt for comparison.
Summary

- 2016 Snowpack is off to a great start
- El Niño pattern still not setting up across Western US.
- Similar El Niño years of 1983 and 1998 both ended up above normal, this year’s snow is similar or better than 1998 in all basins but only the Upper Humboldt is on track to beat both years.
- January is key precip month to change the trajectory of the last 4 years
- It is unlikely one water year can replace drought deficits, it would take a year with 170%-230% of average precip based on the amount of precip missed in last four years.
- Streamflow forecasts (50% exceedence) are 85-125% of average.
- Forecast skill is still low at this time of year, so bounds on forecast (10% and 90% forecasts) cover wide range, comparable to historic range in flows.
- Due to basin hydrology and/or lack of adequate data some forecasts have greater skill than others, but all get better with time. Stay tuned…
When will this happen again?