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

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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

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

January 2017
(more than a normal year’s worth of snow in 1 month)
#Januburied

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

Central Sierra Snow Lab January Snowfall

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

Beat all time monthly record Mar 1992 = 201 in

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

Tahoe +128% (tripled)
Truckee +94% (doubled)
Cason +113% (doubled)
Walker +106% (doubled)
Lower Humboldt +49%
Upper Humboldt +23%
5th highest since 1930

<table>
<thead>
<tr>
<th>Year</th>
<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1932</td>
<td>52.6</td>
</tr>
<tr>
<td>1997</td>
<td>51.8</td>
</tr>
<tr>
<td>1952</td>
<td>45.8</td>
</tr>
<tr>
<td>1969</td>
<td>44.4</td>
</tr>
<tr>
<td>2017</td>
<td>43</td>
</tr>
</tbody>
</table>
February 10, 2017
Snowpack

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

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%
Feb 2017 will set new basin SWE maximums

Truckee River Basin - SWE Index

Carson River Basin - SWE Index

Walker River Basin - SWE Index
Current snowpack already at or above normal (median) peak amounts
Precipitation being estimated at plugged gages in Sierra. At various time 15-25 gages were plugged.
Precipitation Gage Snow Plugs

January 25, 2017
~9ft above snow

22ft tall with no snow
Precip Plugs Dropping Spikes are estimated daily
Worst Case Scenario

Moose Creek SNOTEL, Idaho

Deadwood SNOTEL, Idaho
<3% of state in drought status
Map of 28-day average streamflow compared to historical streamflow for the day of the year (Nevada)

Duration hydrograph of 7-day average runoff for Nevada

Explanation - Percentile classes

<table>
<thead>
<tr>
<th>Low</th>
<th>&lt;10</th>
<th>10-24</th>
<th>25-75</th>
<th>75-90</th>
<th>&gt;90</th>
<th>High</th>
<th>Not-ranked</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Much below normal</td>
<td>Below normal</td>
<td>Normal</td>
<td>Above normal</td>
<td>Much above normal</td>
<td>Runoff</td>
<td></td>
</tr>
</tbody>
</table>
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

USGS 10322500 HUMBOLDT RV AT PALISADE, NV

--- Provisional Data Subject to Revision ---

△ Median daily statistic (109 years) — Discharge

Create presentation-quality / stand-alone graph. Subscribe to WaterAlert

Share this graph | 

Daily discharge, cubic feet per second -- statistics for Feb 9 based on 109 years of record

<table>
<thead>
<tr>
<th>Min (1932)</th>
<th>25th percentile</th>
<th>Median</th>
<th>Mean</th>
<th>75th percentile</th>
<th>Max (1951)</th>
<th>Most Recent Instantaneous Value Feb 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>82</td>
<td>132</td>
<td>190</td>
<td>226</td>
<td>1580</td>
<td>2990</td>
</tr>
</tbody>
</table>
Discharge, cubic feet per second

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

Daily discharge, cubic feet per second -- statistics for Feb 9
based on 89 years of record

| Min (1991) | 25th percentile | Median | Mean | 75th percentile | Max (1997) | Most Recent Instantaneous Value Feb 9
<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>120</td>
<td>387</td>
<td>536</td>
<td>801</td>
<td>839</td>
<td>4050</td>
<td>6420</td>
</tr>
</tbody>
</table>

Daily discharge, cubic feet per second -- statistics for Feb 9
based on 88 years of record

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>49</td>
<td>61</td>
<td>74</td>
<td>90</td>
<td>237</td>
<td>1310</td>
</tr>
</tbody>
</table>

Daily discharge, cubic feet per second -- statistics for Feb 9
based on 105 years of record

| Min (1961) | 25th percentile | Median | Mean | 75th percentile | Max (1999) | Most Recent Instantaneous Value Feb 9
<table>
<thead>
<tr>
<th></th>
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<th></th>
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<tbody>
<tr>
<td>67</td>
<td>169</td>
<td>246</td>
<td>345</td>
<td>412</td>
<td>1830</td>
<td>3150</td>
</tr>
</tbody>
</table>
Numbers inside boxes are KAF for 5 exceedances.

Below Average Volume  Average Volume  Above Average Volume

Colors represent different exceedance 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%

### Summer Streamflow Forecasts

<table>
<thead>
<tr>
<th>Location</th>
<th>Forecast Period</th>
<th>50%</th>
<th>75%</th>
<th>90%</th>
<th>95%</th>
<th>Median</th>
<th>Future</th>
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</thead>
<tbody>
<tr>
<td>L Truckee Riv Boca Reservoir</td>
<td>Apr-Jul</td>
<td>123</td>
<td>150</td>
<td>166</td>
<td>186</td>
<td>215</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mar-Jul</td>
<td>148</td>
<td>179</td>
<td>200</td>
<td>220</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Truckee Riv at Farad</td>
<td>Apr-Jul</td>
<td>375</td>
<td>450</td>
<td>500</td>
<td>550</td>
<td>625</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mar-Jul</td>
<td>455</td>
<td>540</td>
<td>600</td>
<td>660</td>
<td>745</td>
<td></td>
</tr>
<tr>
<td>EF Carson R nr Gardnerville</td>
<td>Apr-Jul</td>
<td>240</td>
<td>310</td>
<td>355</td>
<td>400</td>
<td>465</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mar-Jul</td>
<td>265</td>
<td>340</td>
<td>390</td>
<td>440</td>
<td>515</td>
<td></td>
</tr>
<tr>
<td>WF Carson R nr Woodforks</td>
<td>Apr-Jul</td>
<td>89</td>
<td>104</td>
<td>115</td>
<td>126</td>
<td>141</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mar-Jul</td>
<td>92</td>
<td>112</td>
<td>125</td>
<td>138</td>
<td>158</td>
<td></td>
</tr>
<tr>
<td>Carson R nr Carson City</td>
<td>Apr-Jul</td>
<td>245</td>
<td>325</td>
<td>380</td>
<td>435</td>
<td>515</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mar-Jul</td>
<td>285</td>
<td>390</td>
<td>455</td>
<td>525</td>
<td>630</td>
<td></td>
</tr>
<tr>
<td>Carson R at Ft Churchill</td>
<td>Apr-Jul</td>
<td>205</td>
<td>300</td>
<td>380</td>
<td>470</td>
<td>635</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mar-Jul</td>
<td>265</td>
<td>365</td>
<td>450</td>
<td>545</td>
<td>710</td>
<td></td>
</tr>
<tr>
<td>E Walker R nr Bridgeport</td>
<td>Apr-Aug</td>
<td>71</td>
<td>98</td>
<td>116</td>
<td>134</td>
<td>161</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mar-Aug</td>
<td>78</td>
<td>109</td>
<td>131</td>
<td>152</td>
<td>184</td>
<td></td>
</tr>
<tr>
<td>W Walker R bl L Walker nr Coleville</td>
<td>Apr-Jul</td>
<td>200</td>
<td>250</td>
<td>285</td>
<td>320</td>
<td>370</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mar-Jul</td>
<td>215</td>
<td>265</td>
<td>300</td>
<td>335</td>
<td>385</td>
<td></td>
</tr>
</tbody>
</table>
Key Forecasts:
Humboldt River near Elko 201%
Humboldt River near Imlay 172%
2/8/2017

MONTELLO, 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
February Precipitation Summary

Month-to-Date through Feb 1-10th

Month to Date Precipitation as Percent of Average February Total

<table>
<thead>
<tr>
<th>Location</th>
<th>Basin Index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAKE TAHOE</td>
<td>138</td>
</tr>
<tr>
<td>TRUCKEE RIVER</td>
<td>142</td>
</tr>
<tr>
<td>CARSON RIVER</td>
<td>133</td>
</tr>
<tr>
<td>WALKER RIVER</td>
<td>92</td>
</tr>
<tr>
<td>UPPER HUMBOLDT RIVER</td>
<td>46</td>
</tr>
<tr>
<td>LOWER HUMBOLDT RIVER</td>
<td>48</td>
</tr>
</tbody>
</table>
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/wsv/daily_forecasts.html

Created 7:35 Feb 9 2017
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
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 --


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  
🌐 NATIONAL WEATHER SERVICE
3-Month Outlooks (Feb, Mar, Apr)

Temperature

Precipitation
Boom or Bust

2017!

2012-2015 😞
2016 NRCS Streamflow Forecast Review - Nevada

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

Lake Tahoe Rise Gates Closed (Apr-High)

Truckee R at Farad

Carson R at Ft Churchill

E Walker R nr Bridgeport (Apr-Aug)

W Walker R bl L Walker nr Coleville

Humboldt R nr Imlay

Legend:

Actual Streamflow

90% 70% 50% 30% 10%

Forecast Exceedences
Driest Summer on Record back to ~1900

15 streams had actual Apr-Jul flows that fell between the two driest forecast.

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.