

California Water Supply Outlook Report

January 2024



Photo Credit: Jordan Clayton

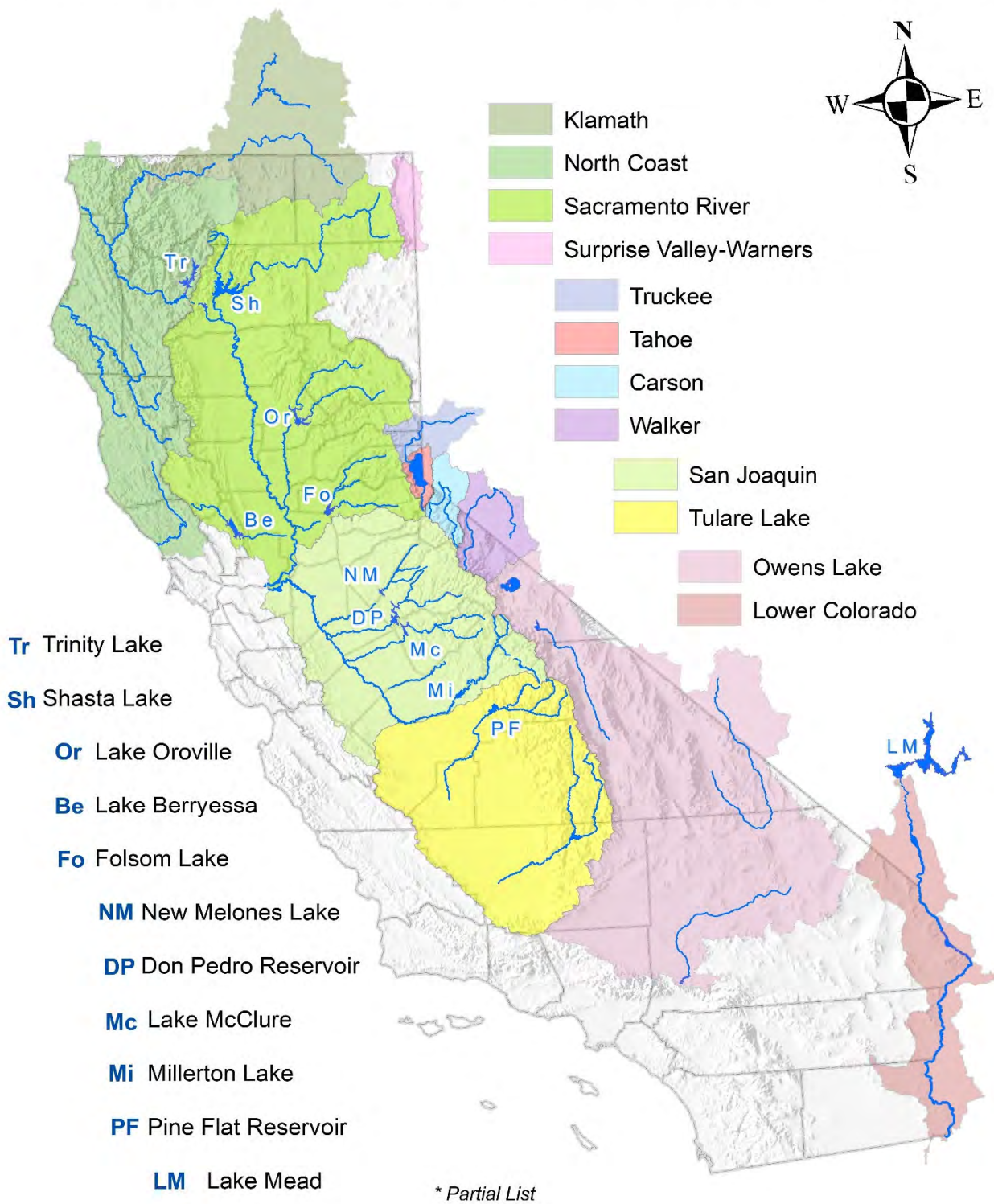
New - Willow Flat SNOTEL in the Little Walker Basin

Last summer the NRCS added a brand-new monitoring site in eastern Sierra. [Willow Flat SNOTEL](#) is in the Little Walker Basin at 8,215 feet elevation. Construction occurred September 12-13, 2023. The new SNOTEL is one mile from an existing snow course where measurements began in 1925. Like most other stations in the Sierra, last winter [Willow Flat snow course](#) saw a record amount of snow. The April 1 snow course measurement recorded 91 inches of snow depth with 37.4 inches of water content. The new SNOTEL's location is as close to the snow course as possible while still allowing summer vehicle access.

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California Forecast Basins, Major Rivers, and Large Reservoirs*



STATE OF CALIFORNIA GENERAL OUTLOOK

January 2024

NEW NRCS Water Supply Forecast System for the American West

This year, the NRCS begins using a new water supply forecast (WSF) system, the Multi-Model Machine-Learning Metasystem, or M4. In comparison to the historic singular WSF model, the new system creates a mean value from six different forecast models. Using the mean of the ensemble of models harnesses the strengths of each technique while insulating against potential individual model vulnerabilities. The original NRCS WSF model remains as part of the suite of ensemble models. Testing shows that the ensemble mean generally equals or exceeds the performance of any individual model member. Application of NRCS water supply probabilistic forecasts remains unchanged.

Contact:

Angus Goodbody, angus.goodbody@usda.gov, Lead Forecast Hydrologist, USDA NRCS Snow Survey and Water Supply Forecasting Program

Additional reading:

- [Assessing the new NRCS water supply forecast model for the American West](#)
- [A Machine Learning Metasystem for Robust Probabilistic Nonlinear Regression-Based Forecasting](#)

NEW Water Supply Outlook Report Format Updates

The California Water Supply Outlook Report uses 3 different data sources: NRCS Snow Survey program data and models for the Eastern Sierras and Klamath basins and California Department of Water Resources (DWR) data and National Weather Service (NWS) data for the Western Sierras basins. Previously, all of the DWR and NWS data were manually pulled into the same charts. In order to make data sources more transparent, each data source will now have its own graphics associated with the individual forecasting basins. NRCS CA is interested in your feedback on the new format. If you have any comments, please email them to: NRCS.CA.Engineering@usda.gov.

Snowpack

As of January 5th, snowpack is 37 percent of normal for the dates in the northern Sierras; 33 percent of normal in the central Sierras; and 25 percent in the southern Sierras. The DWR information sheet is enclosed at the end of the General Outlook. More information is available online at: <http://cdec.water.ca.gov/snow/current/snow/index2.html>.

Precipitation

As of January 8th, the Northern Sierra-, San Joaquin-, and Tulare Basin Index stations received 60-, 41-, and 37 percent of seasonal average to date (23-, 14-, and 16 percent of an average water year). Late December and early January's dry weather patterns helped keep seasonal rainfall totals stagnant. More information is available online at: http://cdec.water.ca.gov/snow_rain.html

Reservoirs

Total reservoir storage of 125 percent of average (excluding Lake Powell and Lake Mead) has not been updated since October 31, 2023. As of January 7, 2024, Storage at Shasta Reservoir was 115 percent of average, same percent of average at the end of December. Oroville Reservoir was 128 percent of average, down slightly from 130 percent of average at the end of December. Don Pedro Reservoir was 116 percent of average, down slightly from 118 percent of average at the end of December. The DWR information sheet is enclosed at the end of the General Outlook. More information is available online at: <https://cdec.water.ca.gov/reservoir.html>.

Streamflow

Forecasts in the Sacramento, San Joaquin, and Tulare basins are only available from the National Weather Service in January and range between 22- and 137 percent of average between April and July. NRCS forecasts in the Tahoe, Truckee, Carson, and Walker River basins are approximately 70 – 80 percent of the 1991-2020 median. NRCS forecasts for stations in the Klamath Basin are 73 – 86 percent of the 1991-2020 medians between March and September and National Weather Service forecasts on the North Coast are below seasonal averages.

Please note that DWR and NWS use percent of average while NRCS uses percent of median to display forecasted stream flows. Future reports will detail the differences between these metrics. Summaries are provided below.



STATEWIDE SNOW WATER CONTENT

CURRENT REGIONAL SNOWPACK FROM AUTOMATED SNOW SENSORS

% of April 1 Average / % of Normal for This Date



NORTH	
Data as of January 5, 2024	
Number of Stations Reporting	28
Average snow water equivalent (Inches)	4.1
Percent of April 1 Average (%)	14
Percent of normal for this date (%)	37

CENTRAL	
Data as of January 5, 2024	
Number of Stations Reporting	53
Average snow water equivalent (Inches)	3.6
Percent of April 1 Average (%)	13
Percent of normal for this date (%)	33

SOUTH	
Data as of January 5, 2024	
Number of Stations Reporting	25
Average snow water equivalent (Inches)	2.2
Percent of April 1 Average (%)	10
Percent of normal for this date (%)	25

STATE	
Data as of January 5, 2024	
Number of Stations Reporting	106
Average snow water equivalent (Inches)	3.4
Percent of April 1 Average (%)	13
Percent of normal for this date (%)	33

Statewide Average: 13% / 33%

Data as of January 5, 2024

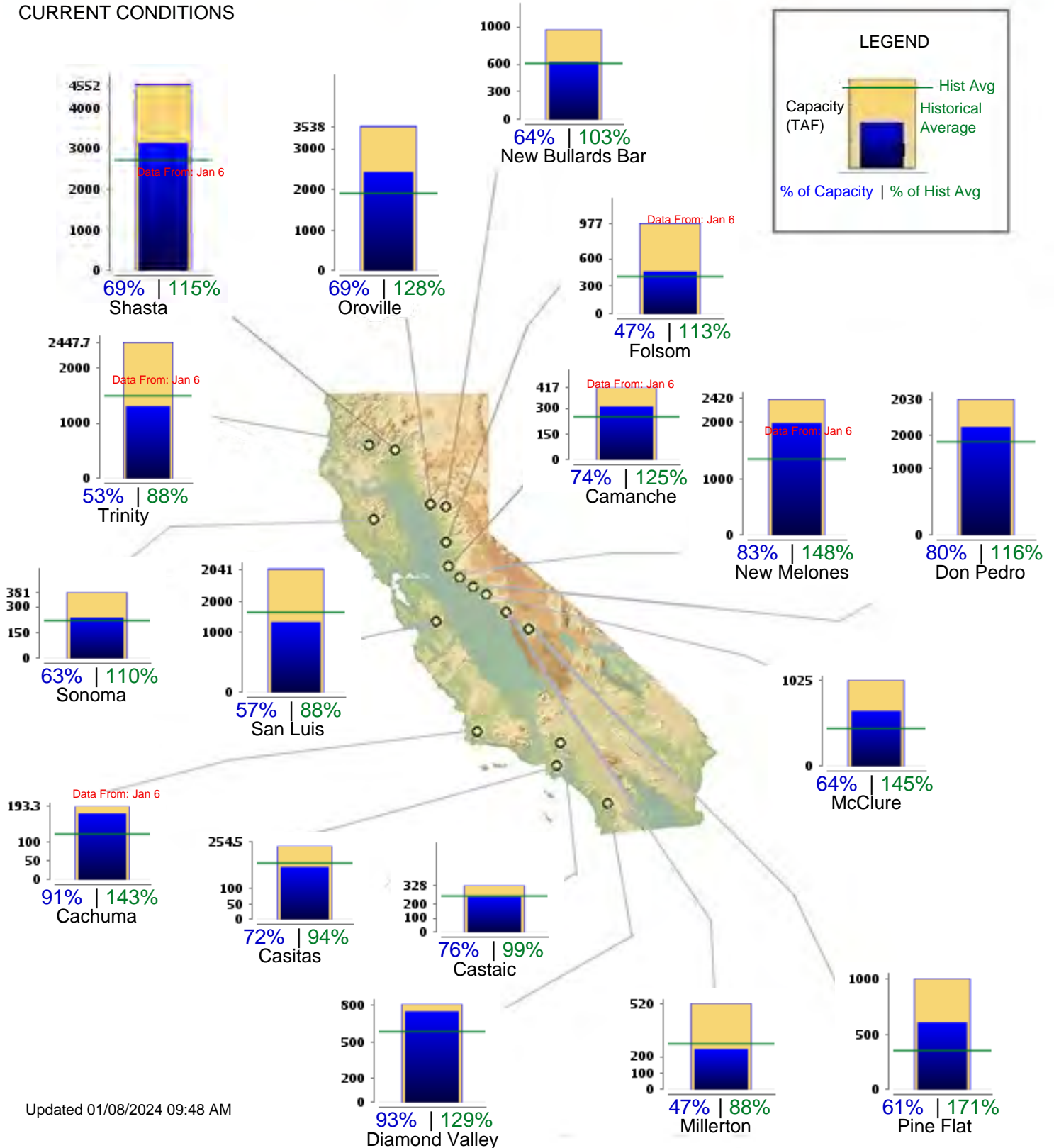


CURRENT RESERVOIR CONDITIONS

CALIFORNIA MAJOR WATER SUPPLY RESERVOIRS

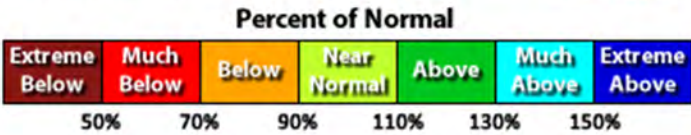
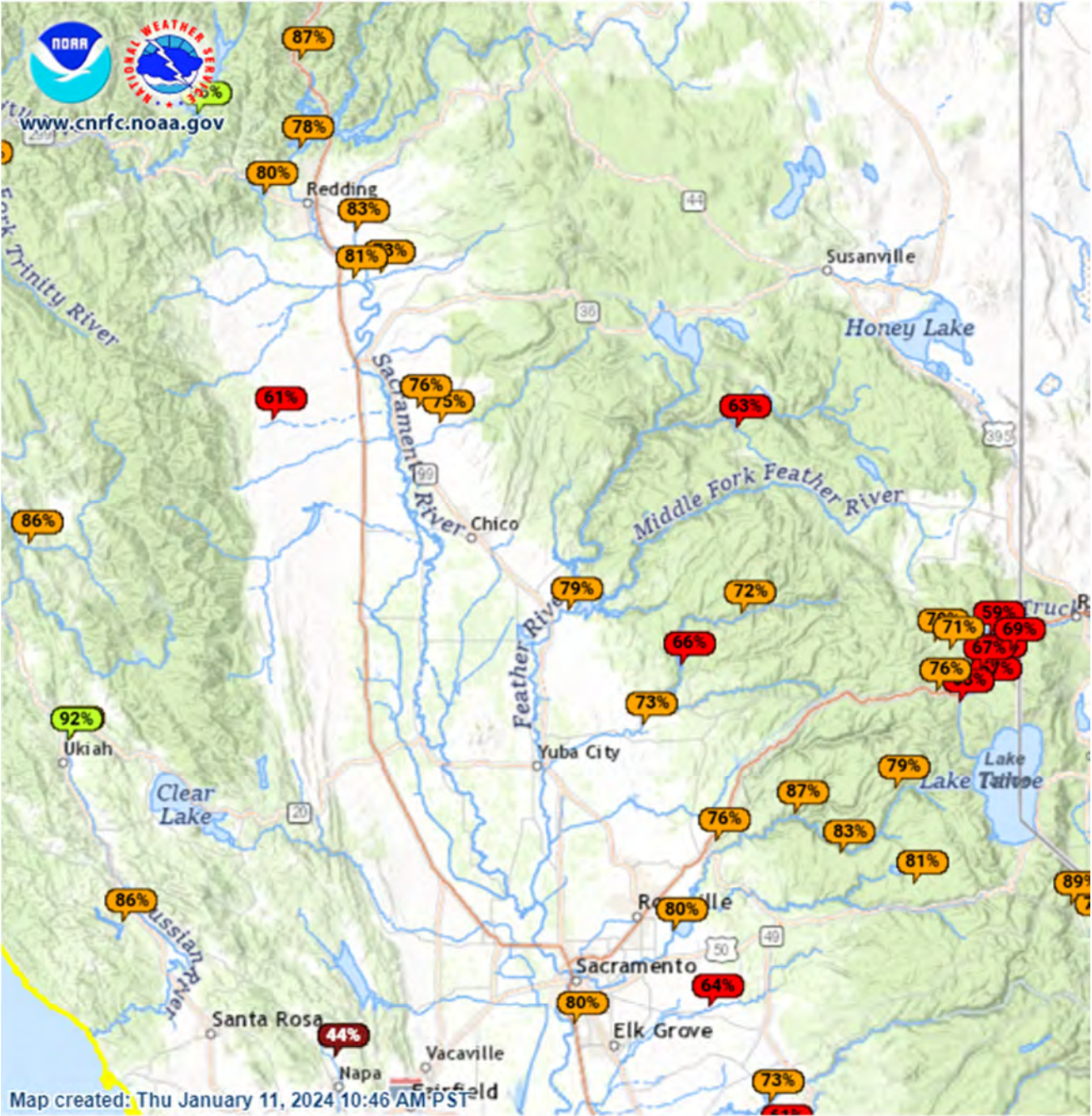
Midnight - January 7, 2024

CURRENT CONDITIONS



Updated 01/08/2024 09:48 AM

Forecast Water Year 2024 Volume



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NATIONAL WEATHER SERVICE / CALIFORNIA-NEVADA RFC / SACRAMENTO CA
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ESP STREAMFLOW VOLUMES IN 1000AF (SRC=E)

		MOST PROBABLE	10% EXC	90% EXC	MANUAL REVIEW	ON DATE (MM/DD/YY)	30YR AVG
SF PIT RIVER LIKELY	APR-JUL	10 (22%)	27	7			47
PIT RIVER CANBY	APR-JUL	30 (42%)	106	12			71
PIT RIVER MONTGOMERY CK	APR-JUL	598 (59%)	983	465			1013
MCCLLOUD RIVER MCCLLOUD	APR-JUL	296 (78%)	490	196			379
SHASTA RIVER DELTA	APR-JUL	234 (75%)	478	104			312
SACRAMENTO SHASTA	APR-JUL	1293 (72%)	2333	869			1803
SACRAMENTO RIVER BEND BRIDGE	APR-JUL	1817 (73%)	3329	1155			2479

For more detailed information see www.cnrfc.noaa.gov/water_resources_update.php

MOST PROB: MOST PROBABLE (50% PROBABILITY OF EXCEEDANCE)
 RMAX: 10% EXC (10% PROBABILITY OF EXCEEDANCE)
 RMIN: 90% EXC (90% PROBABILITY OF EXCEEDANCE)
 MANUAL REVIEW: FORECASTER CHECKED OR COORDINATED ON DATE (MM/DD/YY)
 30YR AVG: 30-YEAR AVERAGE VOLUME (KAF)

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ESP STREAMFLOW VOLUMES IN 1000AF (SRC=E)

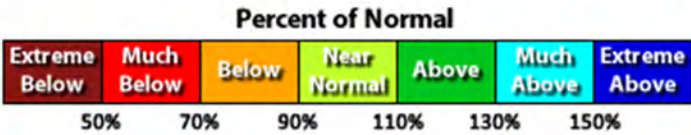
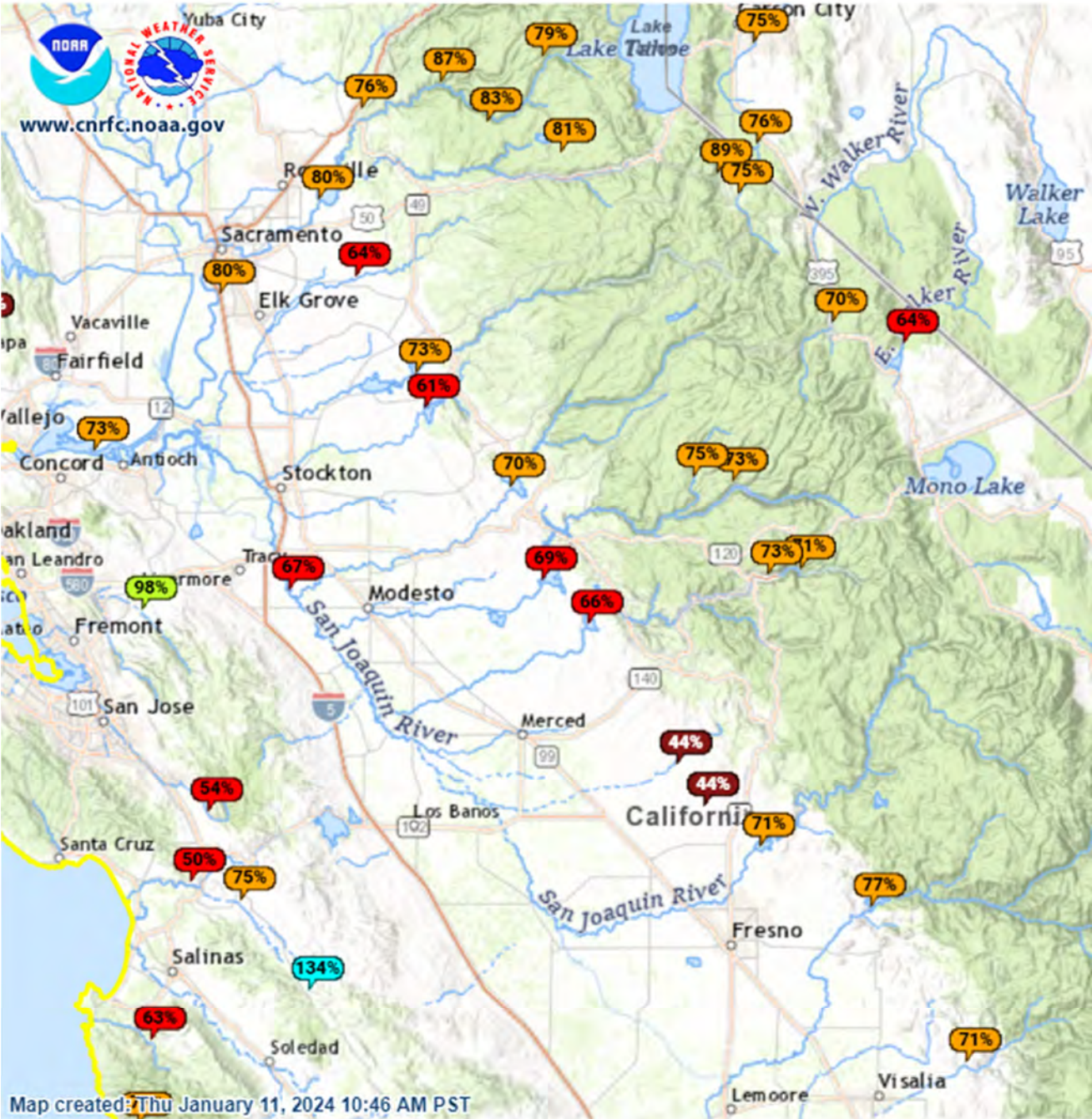
		MOST PROBABLE	10% EXC	90% EXC	MANUAL REVIEW	ON DATE (MM/DD/YY)	30YR AVG
FEATHER LAKE ALMANOR	APR-JUL	267 (80%)	451	171			333
NF FEATHER RIVER PULGA	APR-JUL	665 (137%)	1550	332			484
SPANISH CREEK KEDDIE	APR-JUL	39 (61%)	114	16			65
MF FEATHER RIVER MERRIMAC	APR-JUL	254 (54%)	636	83			467
FEATHER OROVILLE	APR-JUL	1197 (70%)	2800	535			1701
NORTH YUBA RIVER GOODYEARS BAR	APR-JUL	206 (75%)	411	69			273
NF YUBA NEW BULLARDS BAR	APR-JUL	317 (60%)	687	105			526
YUBA ENGLEBRIGHT	APR-JUL	717 (73%)	1500	295			981
NF AMERICAN RIVER NORTH FORK DAM	APR-JUL	184 (74%)	389	78			248
RUBICON RIVER ROCKBOUND LK	APR-JUL	52 (68%)	86	32			76
RUBICON HELL HOLE	APR-JUL	142 (77%)	271	77			185
MF AMERICAN FRENCH MEADOWS	APR-JUL	50 (77%)	98	19			65
GERLE CK LOON LK	APR-JUL	-9999 (-97288%)	-9999	-9999			10
NF MF AMERICAN FORESTHILL	APR-JUL	44 (66%)	94	21			67
MF AMERICAN FORESTHILL	APR-JUL	367 (75%)	778	186			490
SF AMERICAN KYBURZ	APR-JUL	186 (91%)	355	90			205
SILVER CK ICE HOUSE	APR-JUL	33 (81%)	58	18			40
SILVER CK UNION VALLEY	APR-JUL	75 (76%)	137	41			98

SILVER CK CAMINO	APR-JUL	131 (83%)	257	73	158
SF AMERICAN RIVER CHILI BAR DAM	APR-JUL	358 (76%)	708	186	473
AMERICAN FOLSOM	APR-JUL	896 (73%)	1951	450	1232

For more detailed information see www.cnrfc.noaa.gov/water_resources_update.php

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Forecast Water Year 2024 Volume



National Weather Service
Stream Flow Forecasting
Seasonal % Average

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NATIONAL WEATHER SERVICE / CALIFORNIA-NEVADA RFC / SACRAMENTO CA
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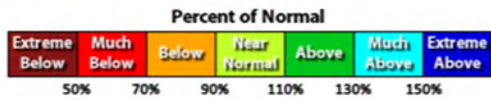
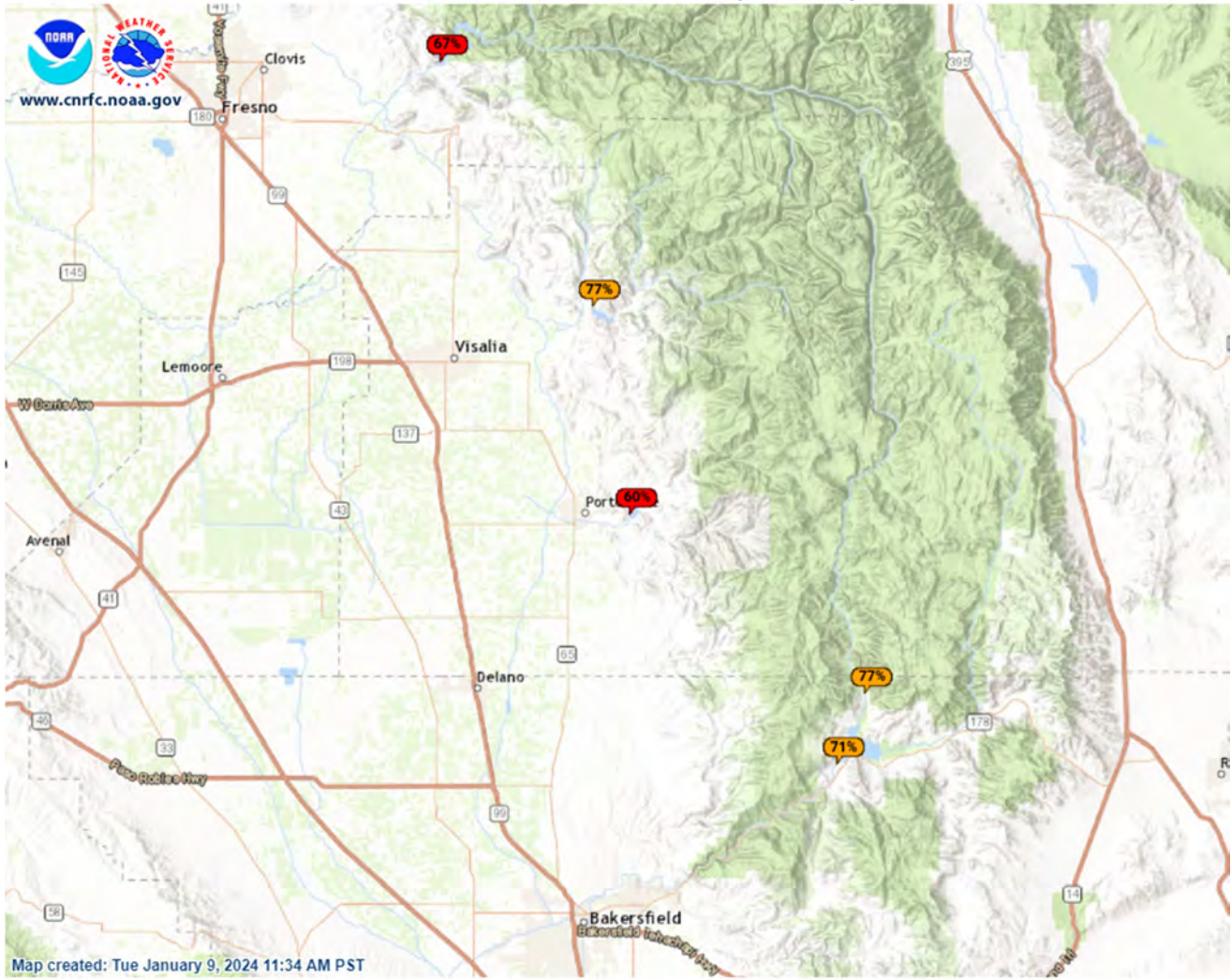
ESP STREAMFLOW VOLUMES IN 1000AF (SRC=E)

		MOST PROBABLE	10% EXC	90% EXC	MANUAL REVIEW	ON DATE (MM/DD/YY)	30YR AVG
SAN JOAQUIN MILLERTON	APR-JUL	811 (64%)	1680	310			1258
MERCED RIVER HAPPY ISLES	APR-JUL	156 (71%)	285	78			221
MERCED RIVER POHONO BRIDGE	APR-JUL	287 (75%)	525	132			384
MERCED EXCHEQUER	APR-JUL	397 (62%)	855	166			642
TUOLUMNE HETCH HETCHY	APR-JUL	448 (75%)	787	217			596
ELEANOR CK LK ELEANOR	APR-JUL	85 (66%)	162	39			130
CHERRY CK CHERRY LK	APR-JUL	169 (77%)	279	88			219
TUOLUMNE NEW DON PEDRO	APR-JUL	901 (73%)	1703	389			1228
STANISLAUS NEW MELONES	APR-JUL	469 (68%)	991	226			690
MOKELUMNE PARDEE	APR-JUL	350 (75%)	642	146			467
SF COSUMNES RIVER SOMERSET	APR-JUL	38 (75%)	95	18			51
NF COSUMNES RIVER EL DORADO	APR-JUL	29 (50%)	86	11			59
COSUMNES RIVER MICHIGAN BAR	APR-JUL	81 (63%)	236	33			128

For more detailed information see
www.cnrfc.noaa.gov/water_resources_update.php

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Forecast Seasonal Volume (WY2024)



National Weather Service
Stream Flow Forecasting
Seasonal % Average

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NATIONAL WEATHER SERVICE / CALIFORNIA-NEVADA RFC / SACRAMENTO CA
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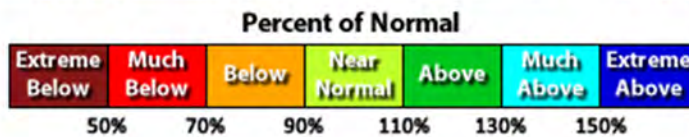
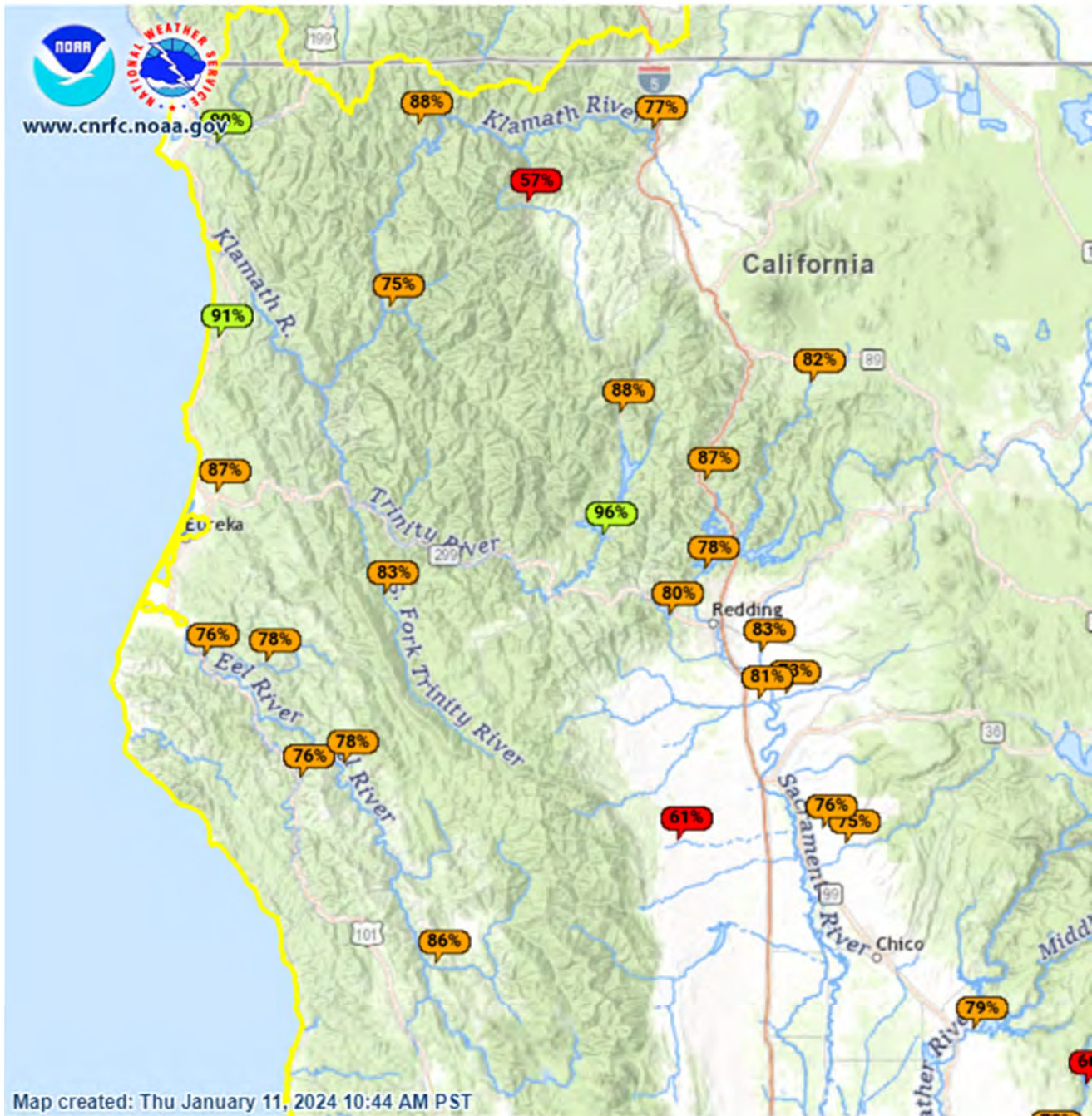
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		MOST PROBABLE	10% EXC	90% EXC	MANUAL REVIEW	ON DATE (MM/DD/YY)	30YR AVG
KERN LK ISABELLA	APR-JUL	322 (71%)	695	168			454
TULE LK SUCCESS	APR-JUL	35 (55%)	89	14			63
KAWEAH LK KAWEAH	APR-JUL	185 (64%)	437	71			288
KINGS PINE FLAT	APR-JUL	745 (61%)	1481	282			1231
SAN JOAQUIN MILLERTON	APR-JUL	811 (64%)	1680	310			1258

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Forecast Water Year 2024 Volume



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NATIONAL WEATHER SERVICE / CALIFORNIA-NEVADA RFC / SACRAMENTO CA
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ESP STREAMFLOW VOLUMES IN 1000AF (SRC=E)

		MOST PROBABLE	RMAX	RMIN	MANUAL REVIEW	ON DATE (MM/DD/YY)	30YR AVG
		-----	-----	-----	-----	-----	-----
SPRAGUE RIVER BEATTY	APR-SEP	177 (152%)	178	176			116
SYCAN RIVER BEATTY	APR-SEP	0 (1%)	1	0			59
SPRAGUE CHILLOQUIN	APR-SEP	292 (139%)	294	292			210
WILLIAMSON RIVER KLAMATH AGENCY	APR-SEP	0 (0%)	0	0			48
WILLIAMSON RIVER CHILOQUIN	APR-SEP	409 (116%)	411	408			354
KLAMATH UPR KLAMATH LK	APR-SEP	478 (101%)	488	475			475
LOST CLEAR LAKE	APR-SEP	101 (285%)	102	101			36
MILLER CK GERBER	APR-SEP	29 (205%)	30	29			14
SHASTA RIVER YREKA	APR-JUL	19 (66%)	19	19			29
SCOTT RIVER FORT JONES	APR-JUL	235 (136%)	235	235			173
INDIAN CREEK HAPPY CAMP	APR-JUL	172 (185%)	172	172			93
SALMON RIVER SOMES BAR	APR-JUL	701 (141%)	701	701			499
TRINITY TRINITY LK	APR-JUL	1038 (156%)	1038	1038			666
SF TRINITY RIVER HYAMPOM	APR-JUL	441 (200%)	441	441			221

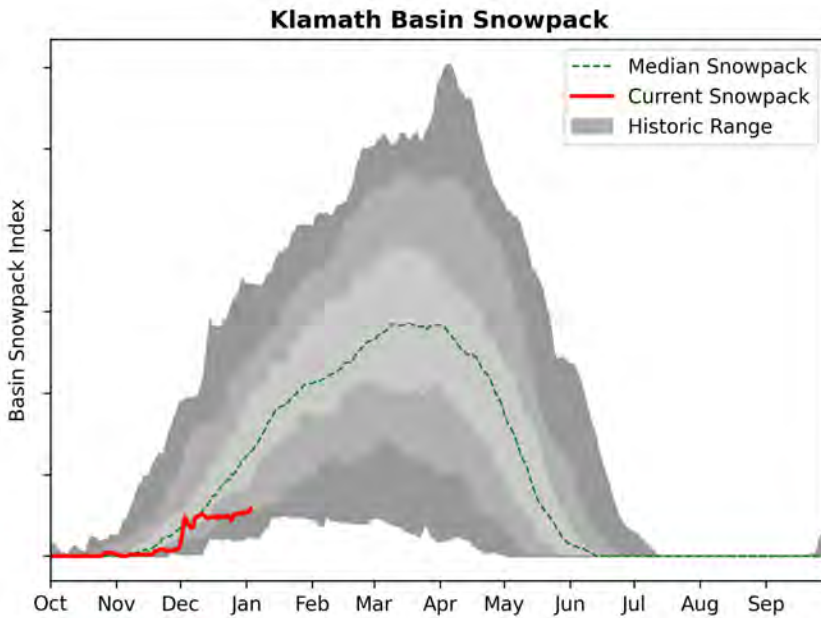
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Klamath Basin Summary

Provided by:
NRCS Oregon

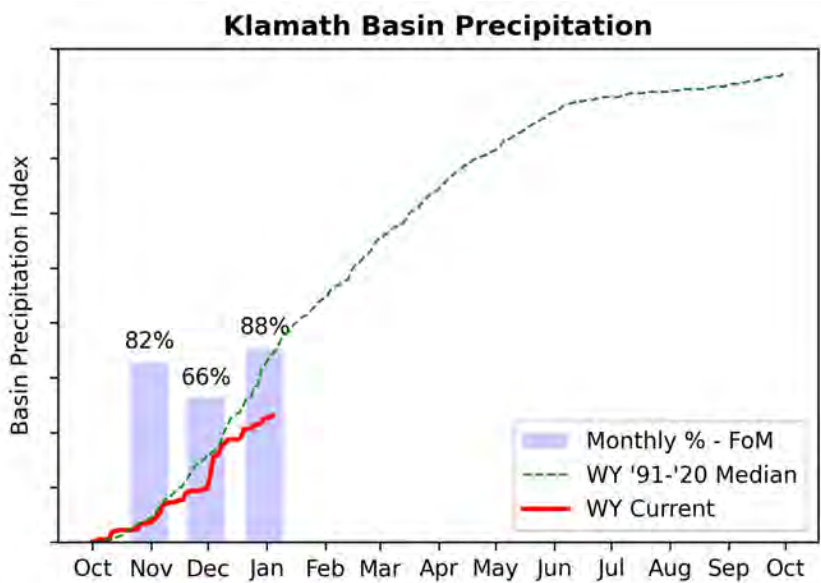
SNOWPACK



► View snowpack for individual sites by accessing the basin data report [here](#).

As of January 1, the basin snowpack is 39% of median. Last month on December 1 the basin snowpack was 44% of median.

PRECIPITATION



► View precipitation for individual sites by accessing the basin data report [here](#).

FoM = First of Month

January precipitation is below normal at 88% of median. Precipitation since the beginning of the water year (October 1 - January 1) is 69% of median.

RESERVOIR STORAGE

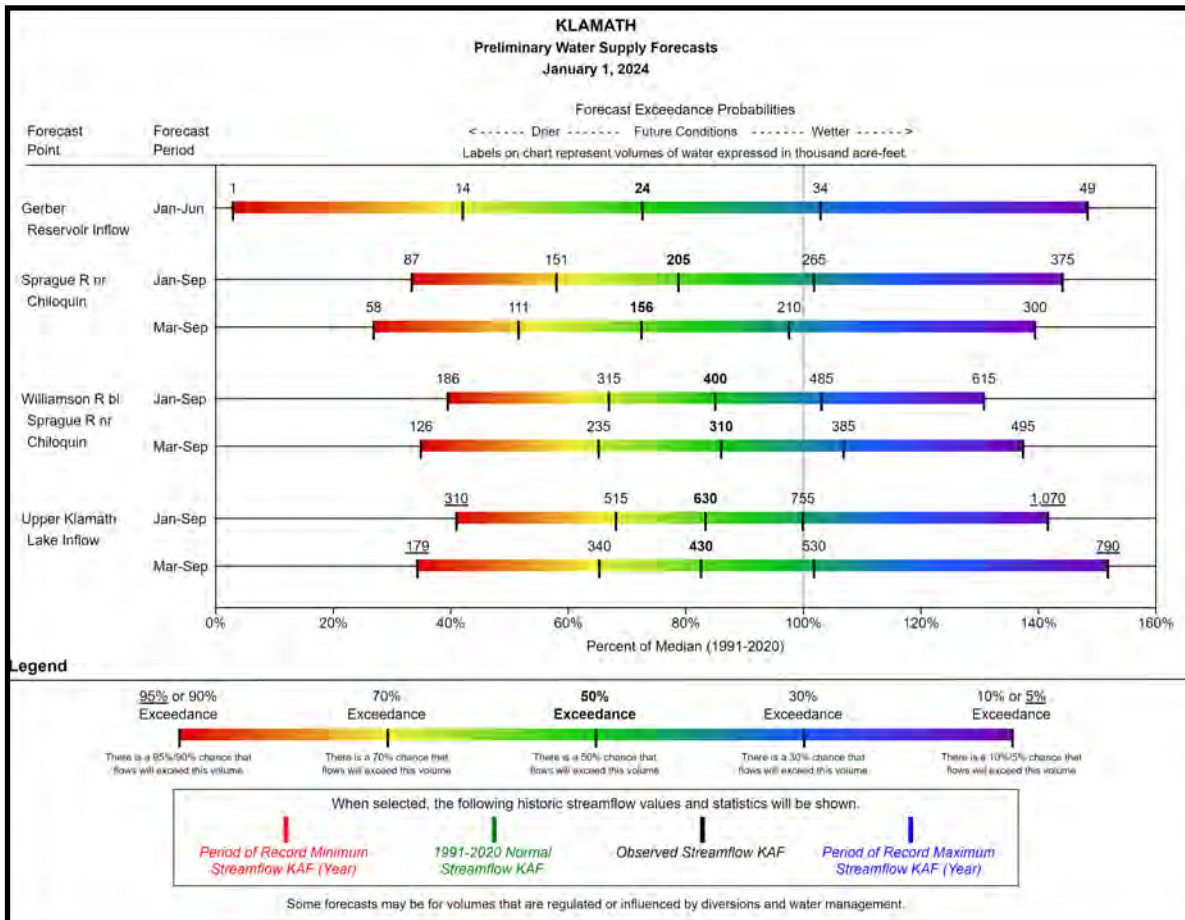
As of January 1, storage at major reservoirs in the basin ranges from 49% of median at Fourmile Lake to 100% of median at Upper Klamath Lake.

Klamath	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)	Current % Capacity	Last Year % Capacity	Median % Capacity	Current % Median	Last Year % Median
Fourmile Lake	2.6	3.1	5.2	15.6	16%	20%	33%	49%	59%
Gerber	15.4	3.2	36.9	94.3	16%	3%	39%	42%	9%
Hyatt Prairie	7.0	1.2	9.9	16.2	43%	7%	61%	71%	12%
Clear Lake	72.8	36.2	104.6	513.3	14%	7%	20%	70%	35%
Upper Klamath Lake	259.0	260.5	259.7	523.7	49%	50%	50%	100%	100%
Howard Prairie	21.6	6.4	36.0	62.1	35%	10%	58%	60%	18%
Basin Index					31%	25%	37%	84%	69%
# of reservoirs					6	6	6	6	6

STREAMFLOW FORECAST

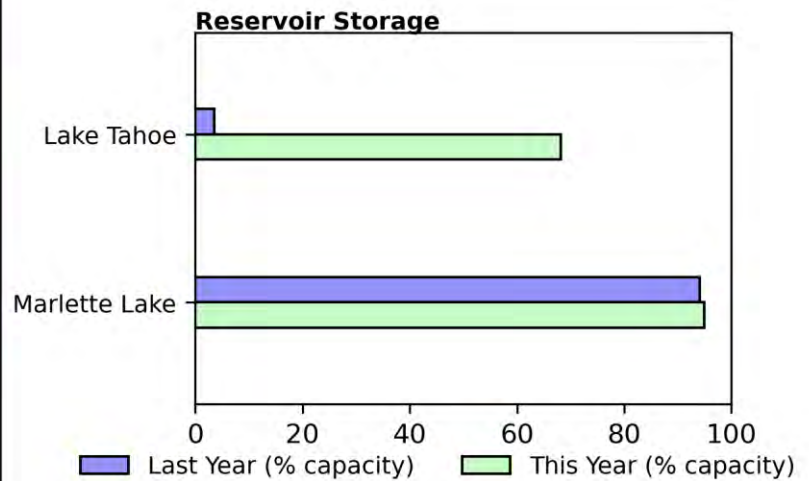
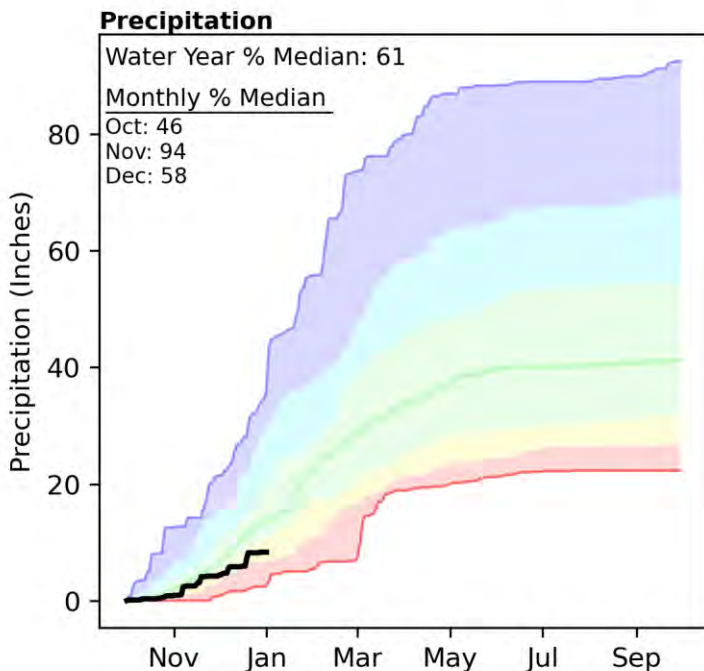
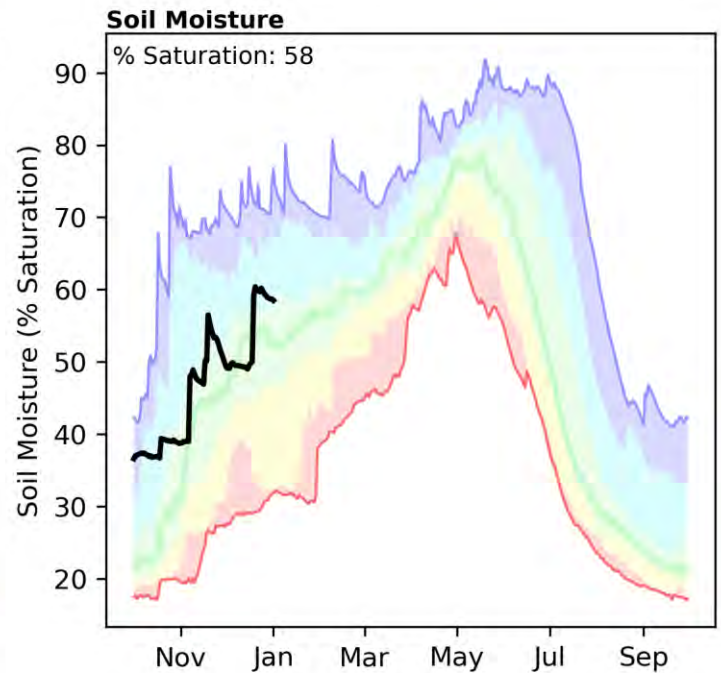
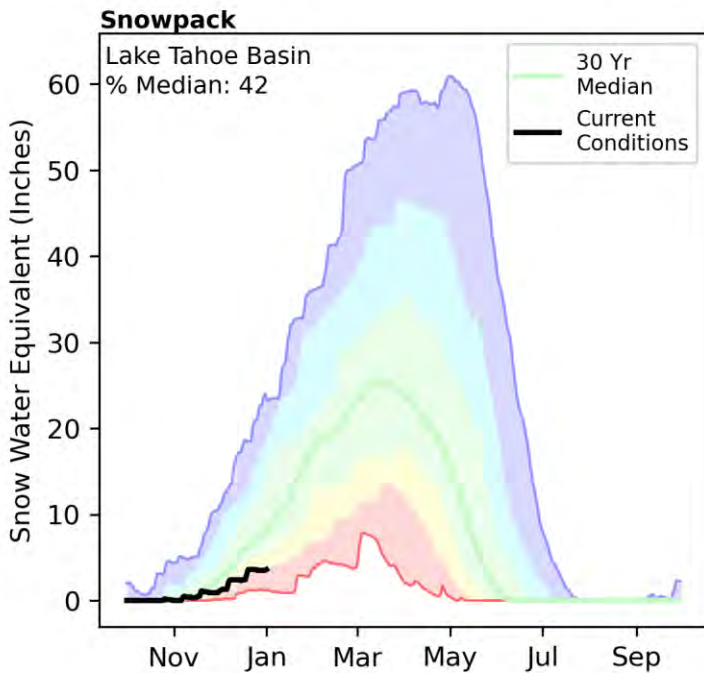
The streamflow forecasts in the basin range from 73% to 86% of median.

For data in tabular format, in addition to non-primary period data, please view the basin data reports [here](#).



Lake Tahoe Basin | January 1, 2024

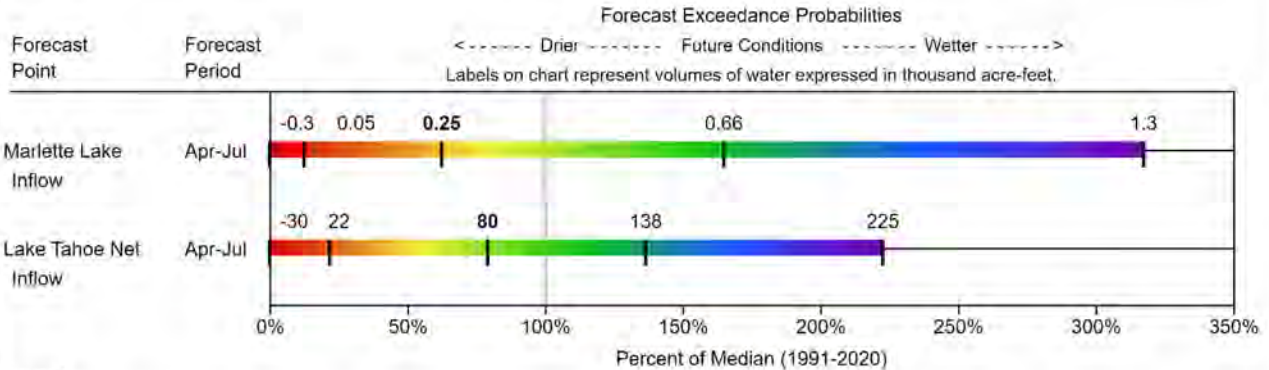
Snowpack in the Lake Tahoe Basin is well below normal at 42% of median, compared to 215% at this time last year. Precipitation in December was well below normal at 58%, which brings the seasonal accumulation (October-December) to 61% of median. Soil moisture is at 58% saturation compared to 65% saturation last year. Reservoir storage is 69% of capacity, compared to 5% last year.



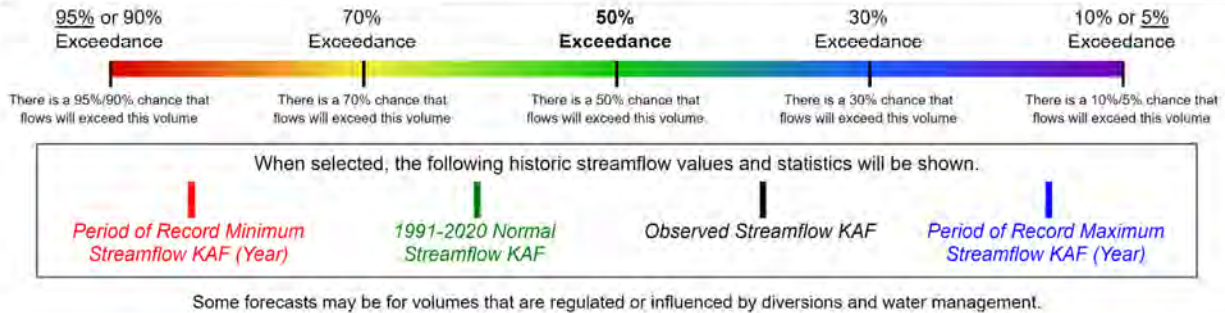
Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
For more information visit: [30 year normal calculation description](#)

Important Information about Forecast Coordination: Hydrologists with the NRCS and National Weather Service California Nevada River Forecast Center (CNRFC) coordinate Lake Tahoe Rise, Truckee River at Farad, Little Truckee River near Boca, and the Carson River at Ft. Churchill forecasts (following page) using output of their respective hydrology models at the request of the Bureau of Reclamation. The NRCS model is a statistical model based on the current data as of the first of each month. The CNRFC ensemble forecasting system incorporates near-term weather prediction and climatology into their model. These models can provide different answers because of the nature of the model systems, and from the inclusion of future weather in the CNRFC model. The hydrologists agree on forecast values using guidance from both models to best provide an accurate water supply forecast for these points.

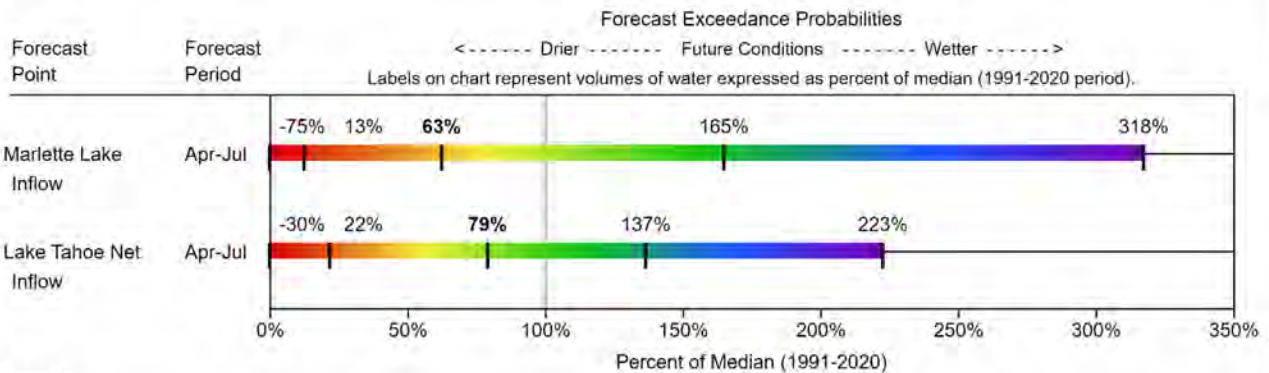
**TAHOE
Water Supply Forecasts
January 1, 2024**



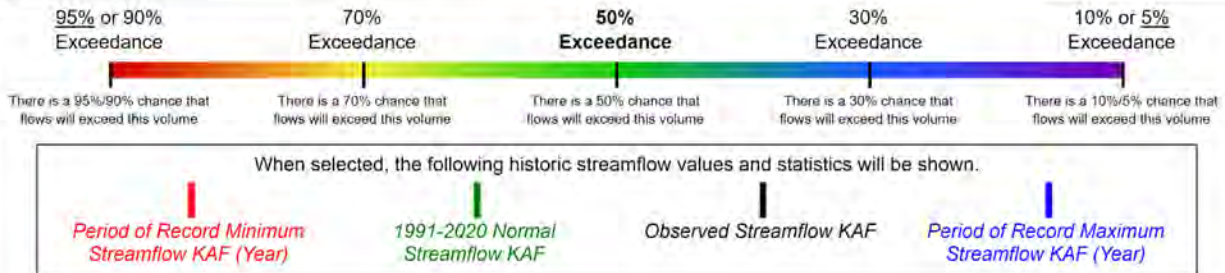
Legend



**TAHOE
Water Supply Forecasts
January 1, 2024**

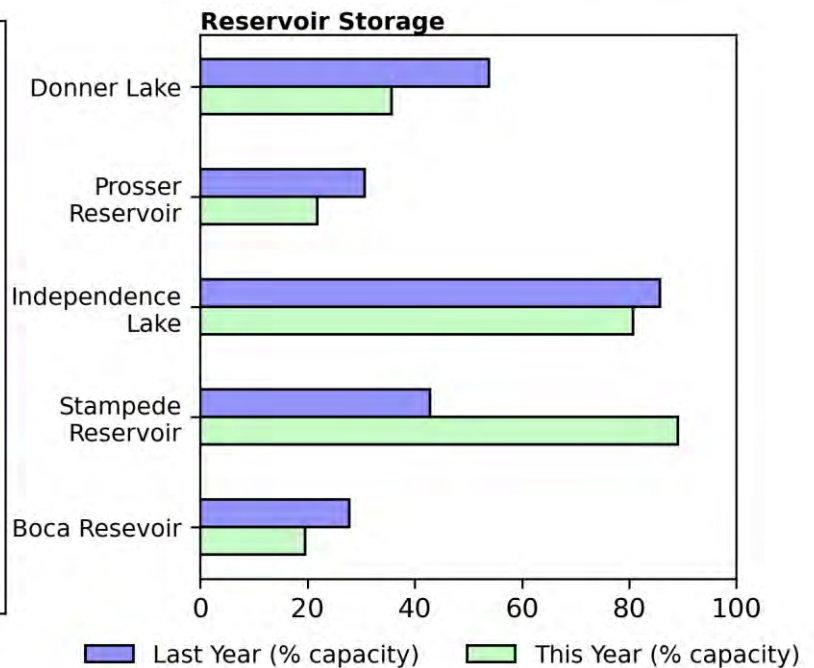
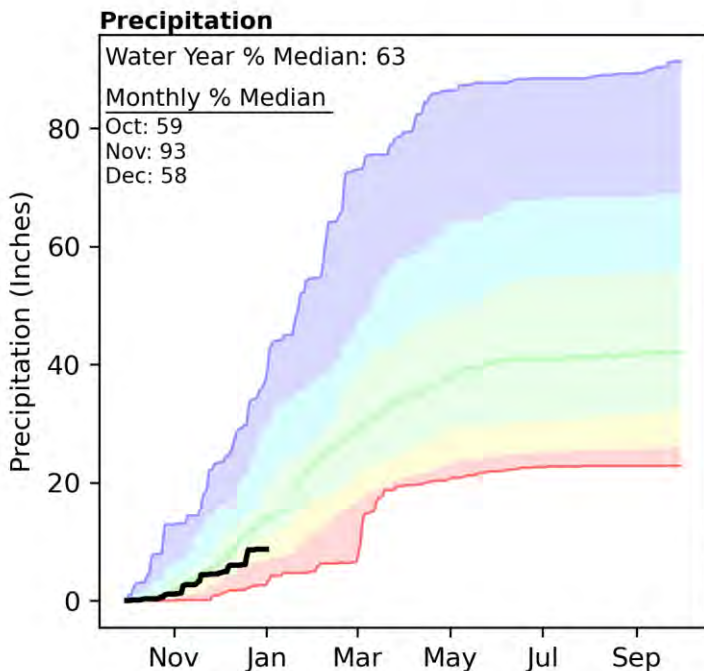
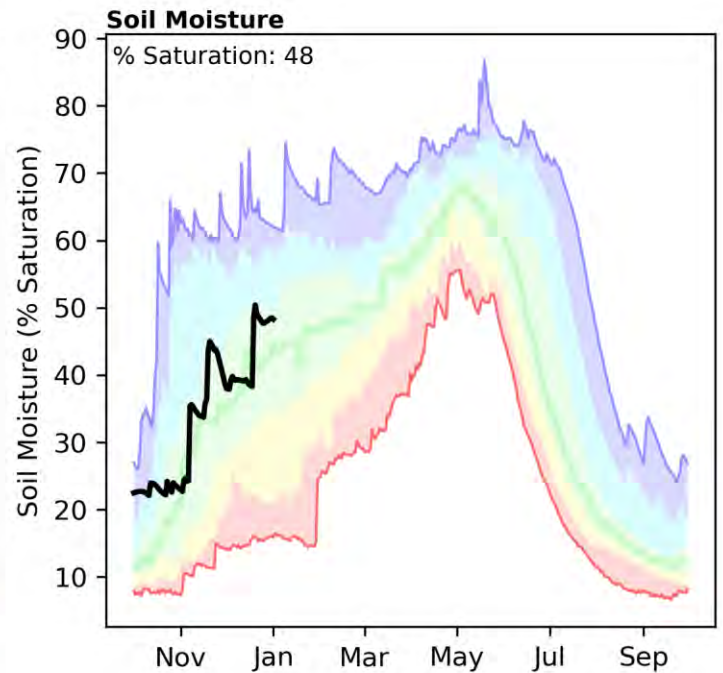
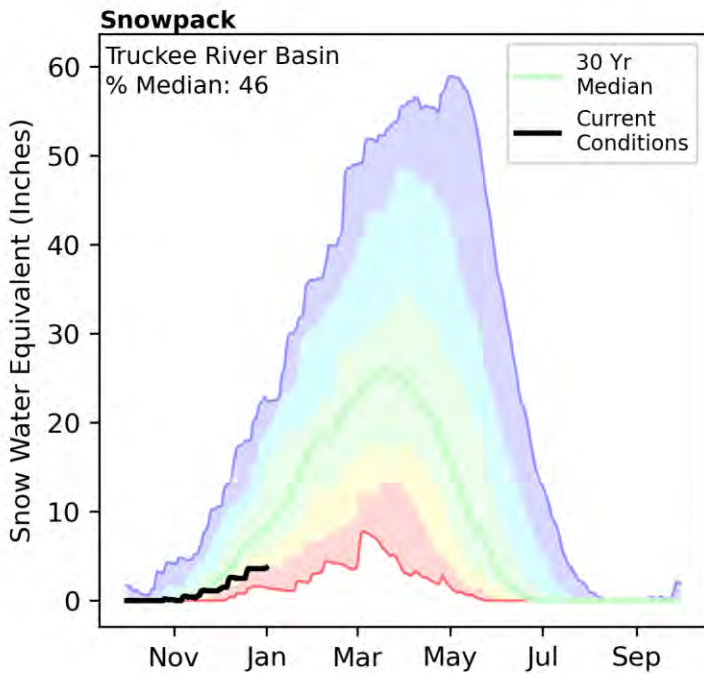


Legend



Truckee River Basin | January 1, 2024

Snowpack in the Truckee River Basin is well below normal at 46% of median, compared to 221% at this time last year. Precipitation in December was well below normal at 58%, which brings the seasonal accumulation (October-December) to 63% of median. Soil moisture is at 48% saturation compared to 57% saturation last year. Reservoir storage is 72% of capacity, compared to 42% last year.

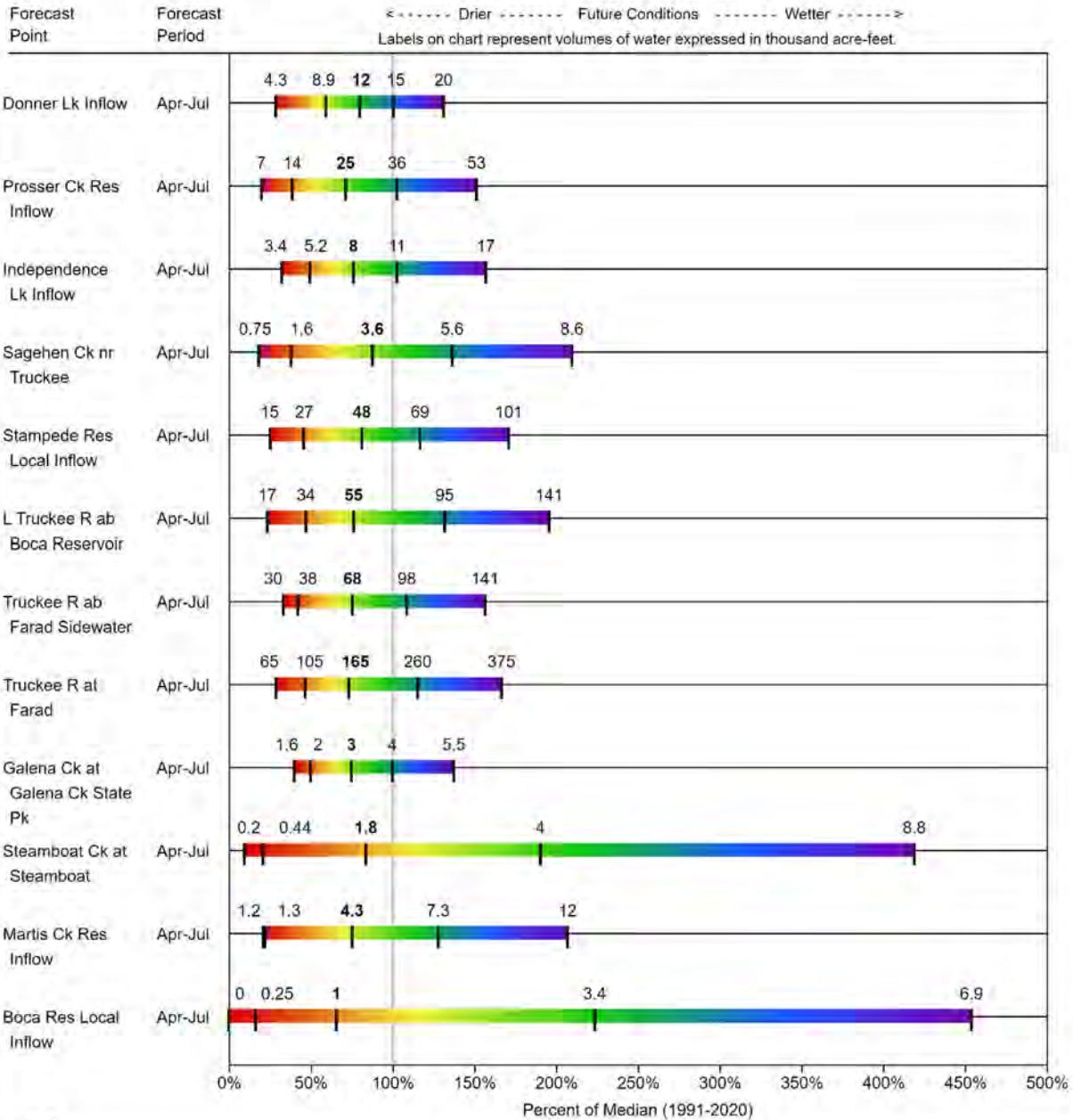


Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
For more information visit: [30 year normal calculation description](#)

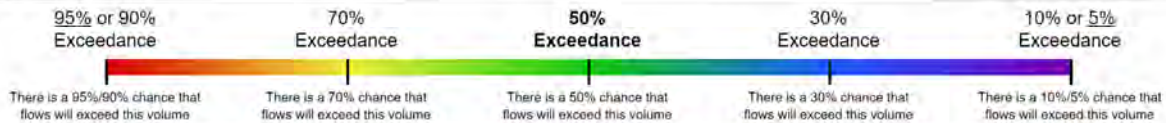
Important Information about Forecast Coordination: Hydrologists with the NRCS and National Weather Service California Nevada River Forecast Center (CNRFC) coordinate Lake Tahoe Rise, Truckee River at Farad, Little Truckee River near Boca, and the Carson River at Ft. Churchill forecasts (following page) using output of their respective hydrology models at the request of the Bureau of Reclamation. The NRCS model is a statistical model based on the current data as of the first of each month. The CNRFC ensemble forecasting system incorporates near-term weather prediction and climatology into their model. These models can provide different answers because of the nature of the model systems, and from the inclusion of future weather in the CNRFC model. The hydrologists agree on forecast values using guidance from both models to best provide an accurate water supply forecast for these points.

TRUCKEE
Water Supply Forecasts
January 1, 2024

Forecast Exceedance Probabilities



Legend



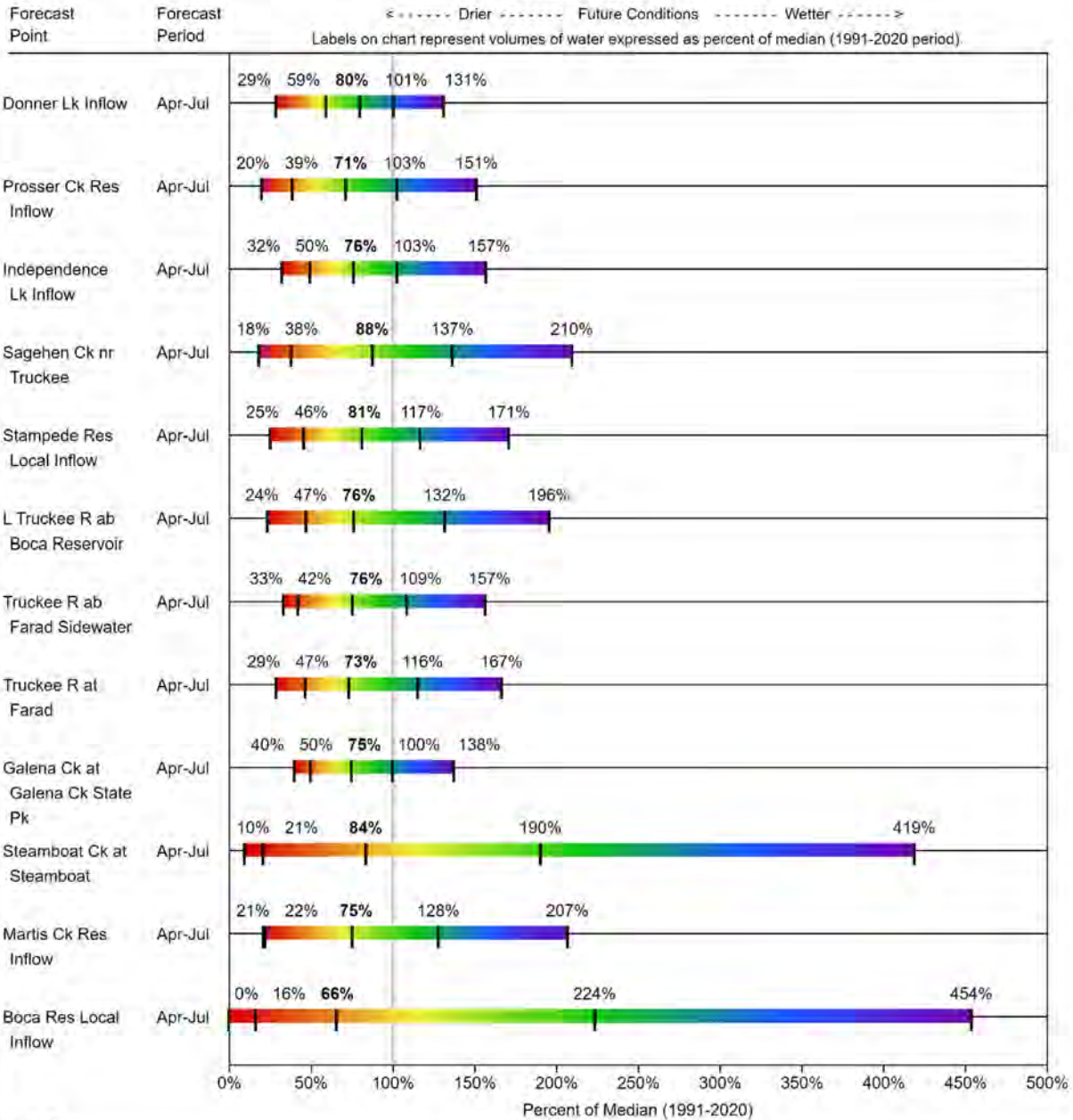
When selected, the following historic streamflow values and statistics will be shown.

<i>Period of Record Minimum Streamflow KAF (Year)</i>	<i>1991-2020 Normal Streamflow KAF</i>	<i>Observed Streamflow KAF</i>	<i>Period of Record Maximum Streamflow KAF (Year)</i>

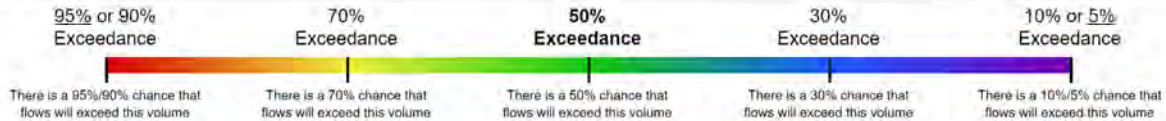
Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

TRUCKEE
Water Supply Forecasts
January 1, 2024

Forecast Exceedance Probabilities



Legend



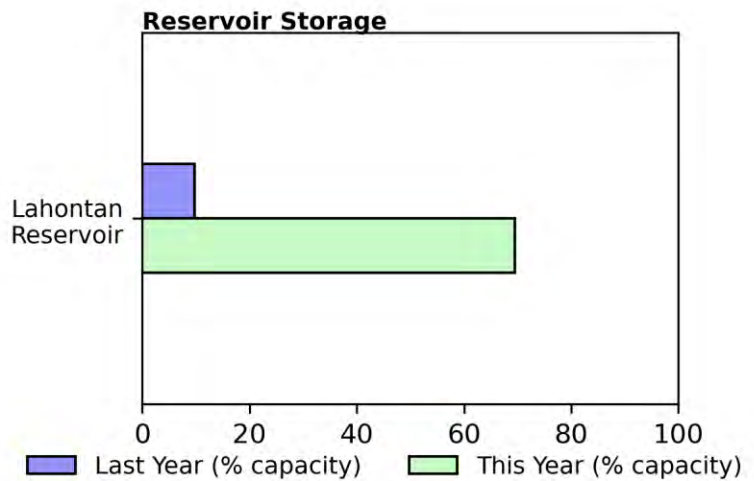
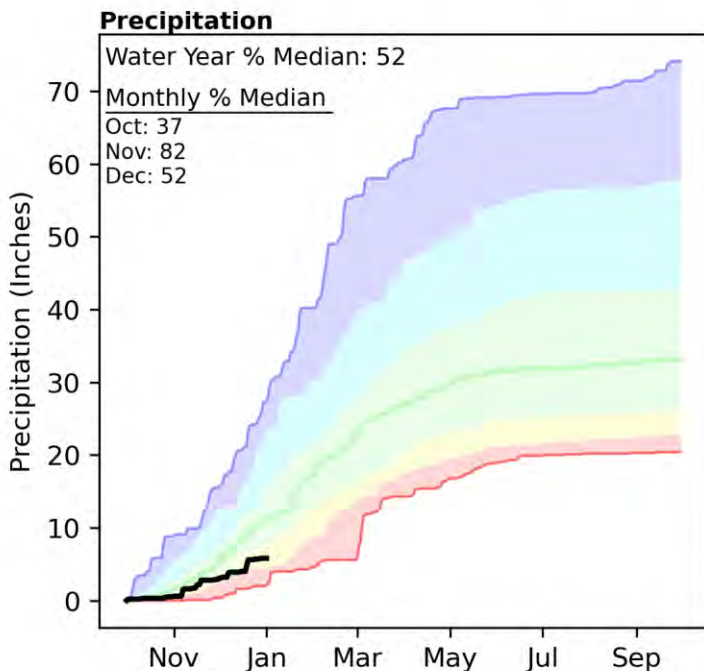
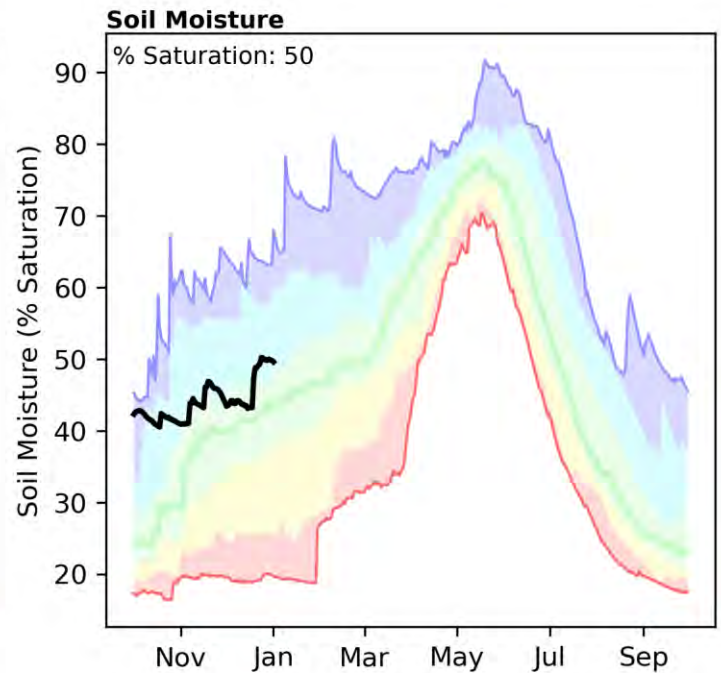
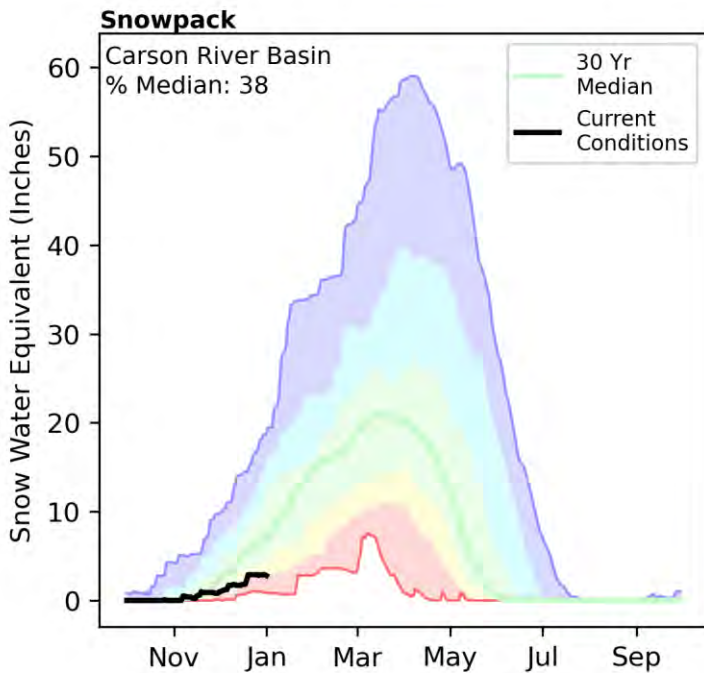
When selected, the following historic streamflow values and statistics will be shown.

<i>Period of Record Minimum Streamflow KAF (Year)</i>	<i>1991-2020 Normal Streamflow KAF</i>	<i>Observed Streamflow KAF</i>	<i>Period of Record Maximum Streamflow KAF (Year)</i>

Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

Carson River Basin | January 1, 2024

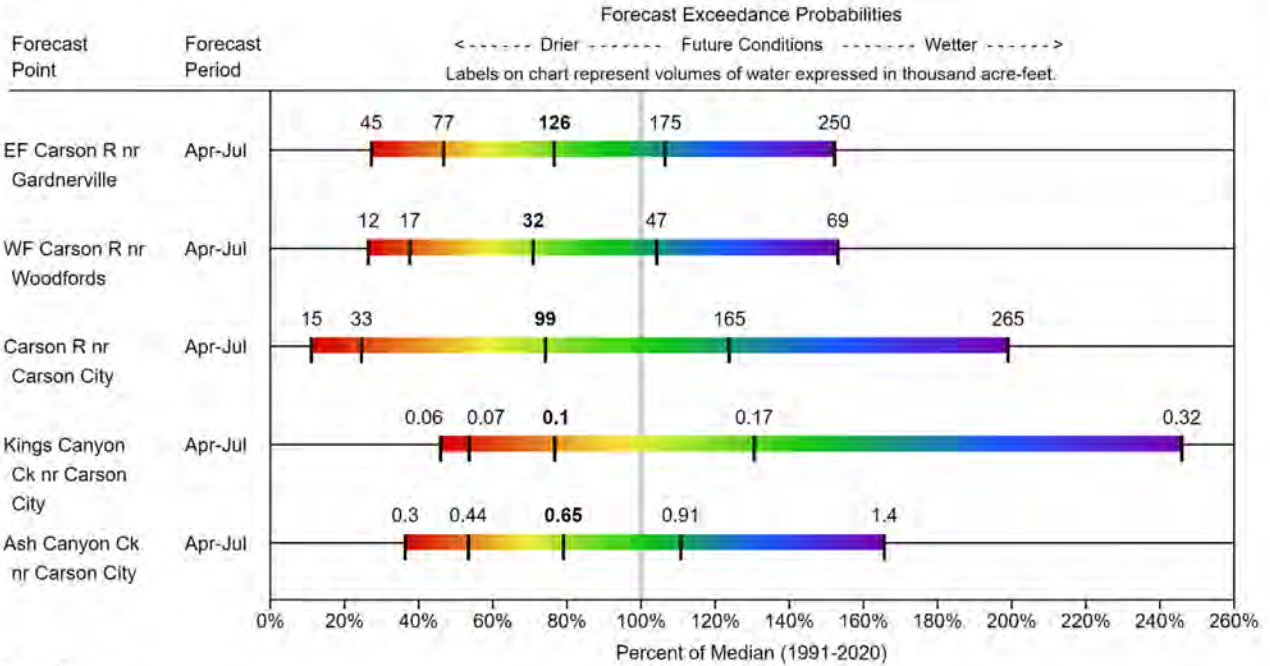
Snowpack in the Carson River Basin is well below normal at 38% of median, compared to 241% at this time last year. Precipitation in December was well below normal at 52%, which brings the seasonal accumulation (October-December) to 52% of median. Soil moisture is at 50% saturation compared to 54% saturation last year. Reservoir storage is 70% of capacity, compared to 10% last year.



Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles. For more information visit: [30 year normal calculation description](#)

Important Information about Forecast Coordination: Hydrologists with the NRCS and National Weather Service California Nevada River Forecast Center (CNRFC) coordinate Lake Tahoe Rise, Truckee River at Farad, Little Truckee River near Boca, and the Carson River at Ft. Churchill forecasts (following page) using output of their respective hydrology models at the request of the Bureau of Reclamation. The NRCS model is a statistical model based on the current data as of the first of each month. The CNRFC ensemble forecasting system incorporates near-term weather prediction and climatology into their model. These models can provide different answers because of the nature of the model systems, and from the inclusion of future weather in the CNRFC model. The hydrologists agree on forecast values using guidance from both models to best provide an accurate water supply forecast for these points.

CARSON
Water Supply Forecasts
January 1, 2024

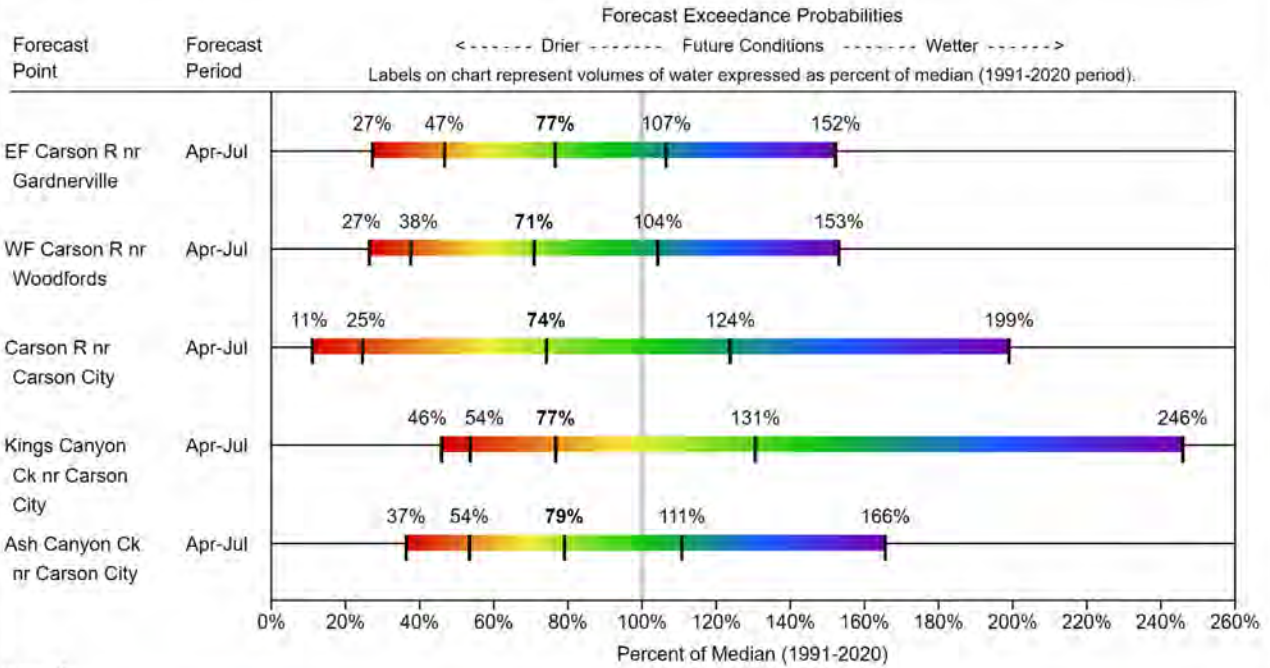


Legend

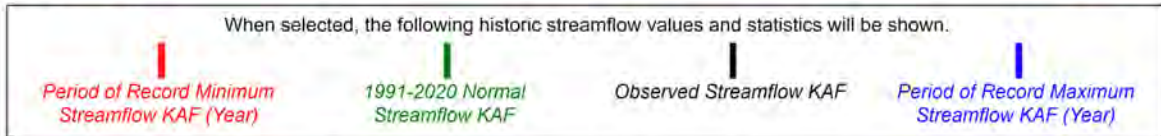
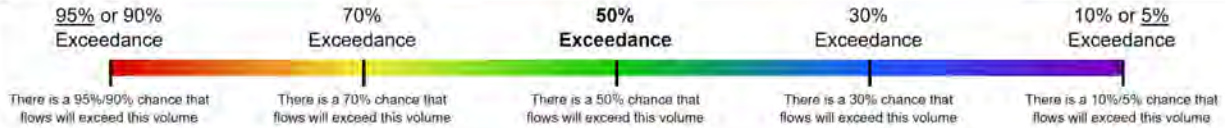


Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

CARSON Water Supply Forecasts January 1, 2024



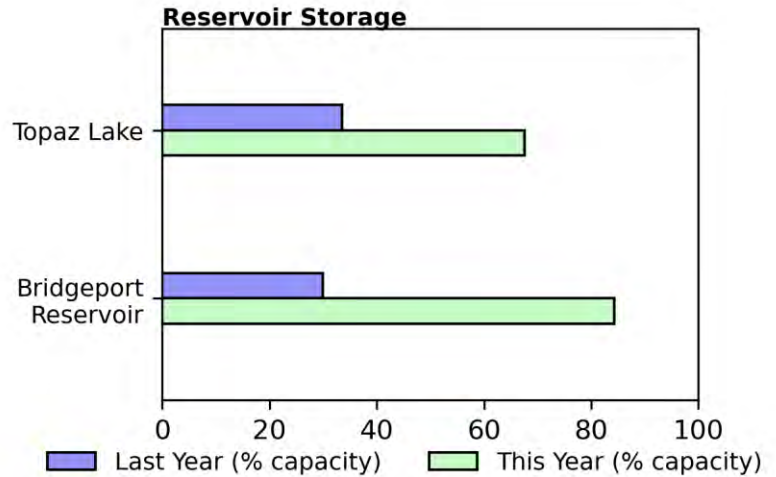
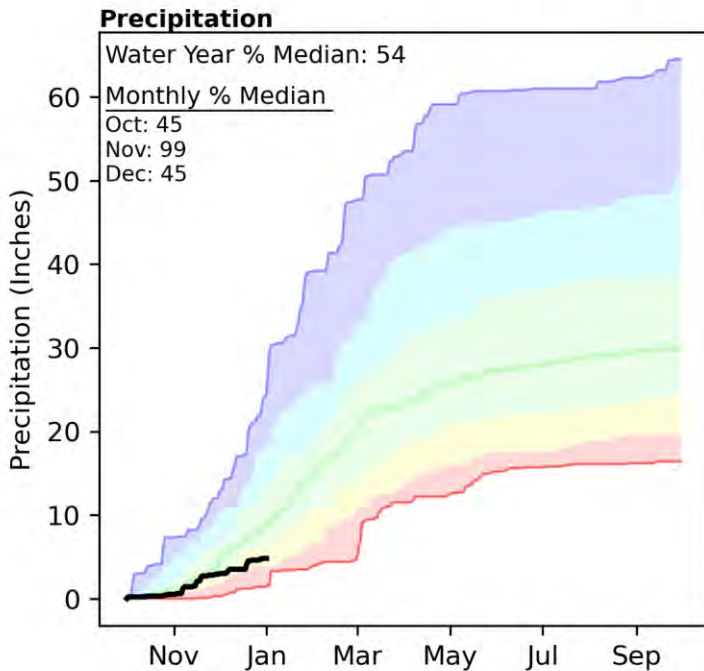
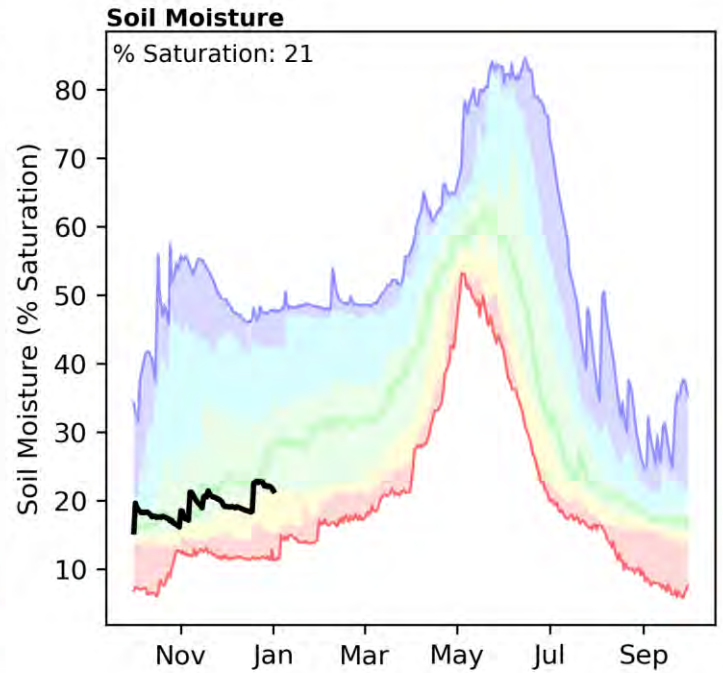
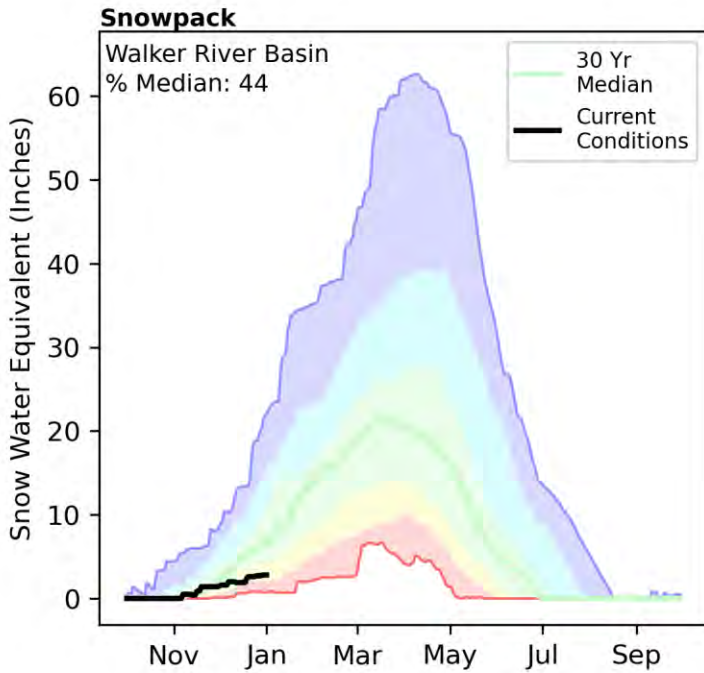
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Some forecasts may be for volumes that are regulated or influenced by diversions and water management.

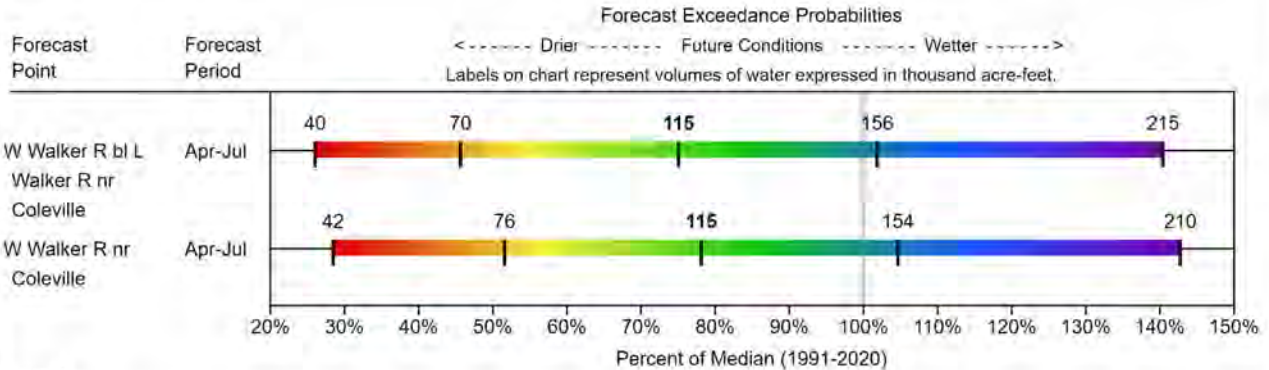
Walker River Basin | January 1, 2024

Snowpack in the Walker River Basin is well below normal at 44% of median, compared to 269% at this time last year. Precipitation in December was well below normal at 45%, which brings the seasonal accumulation (October-December) to 54% of median. Soil moisture is at 21% saturation compared to 39% saturation last year. Reservoir storage is 75% of capacity, compared to 32% last year.

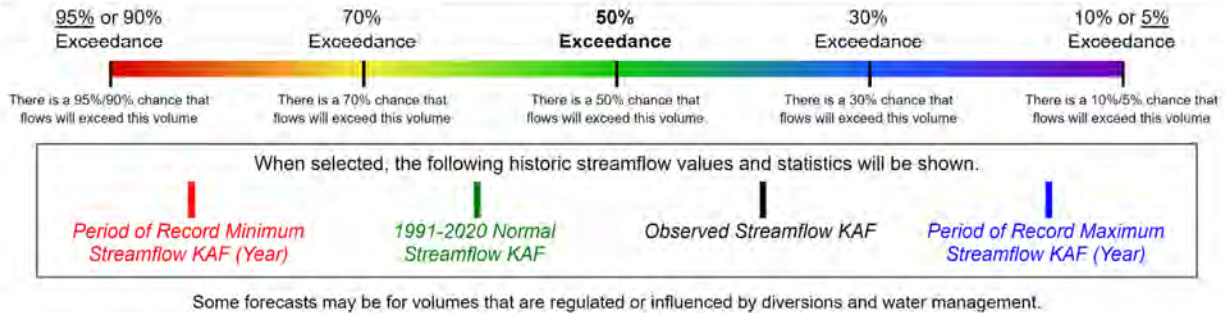


Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
For more information visit: [30 year normal calculation description](#)

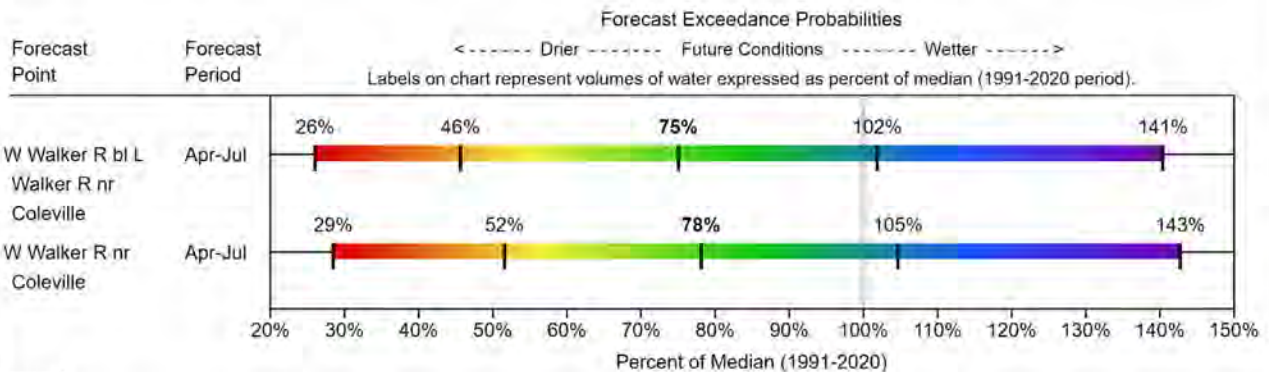
WALKER
Water Supply Forecasts
January 1, 2024



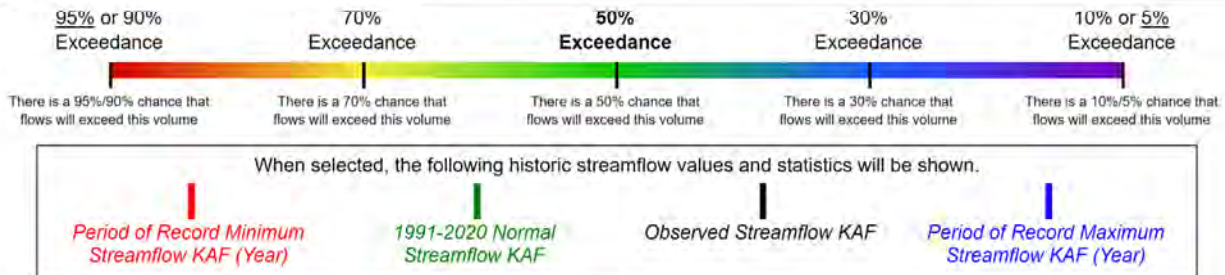
Legend



WALKER
Water Supply Forecasts
January 1, 2024

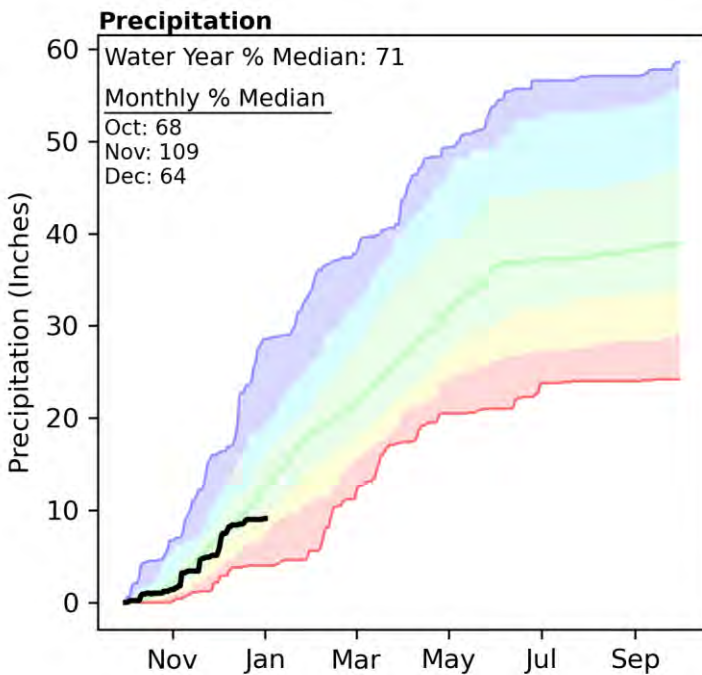
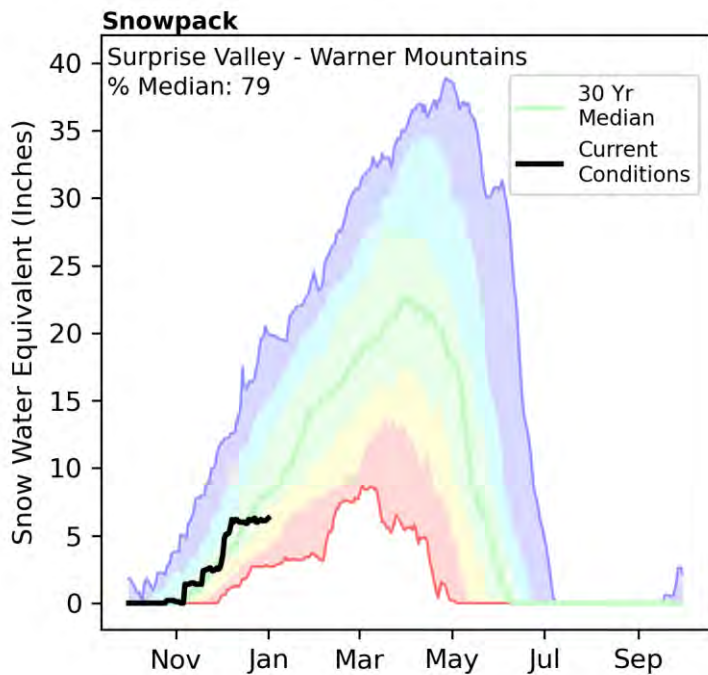


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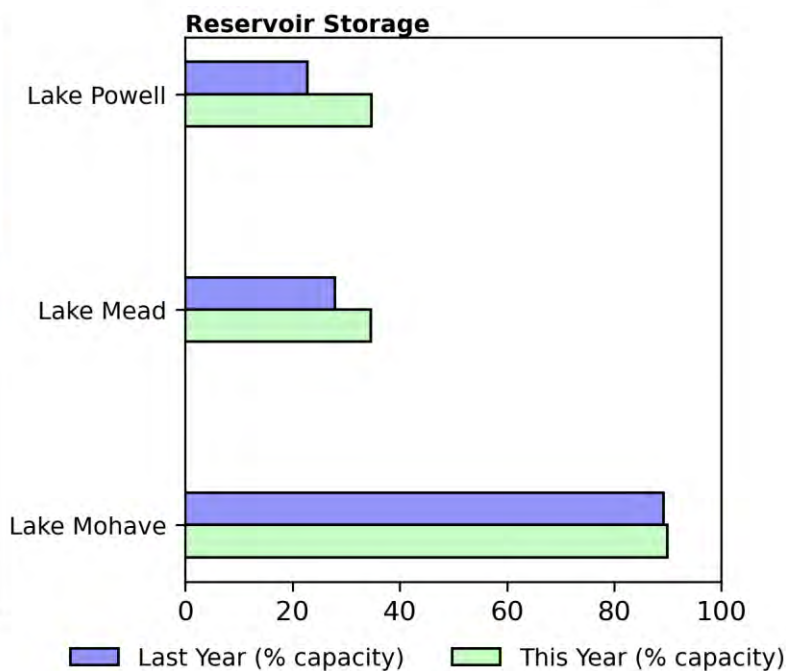
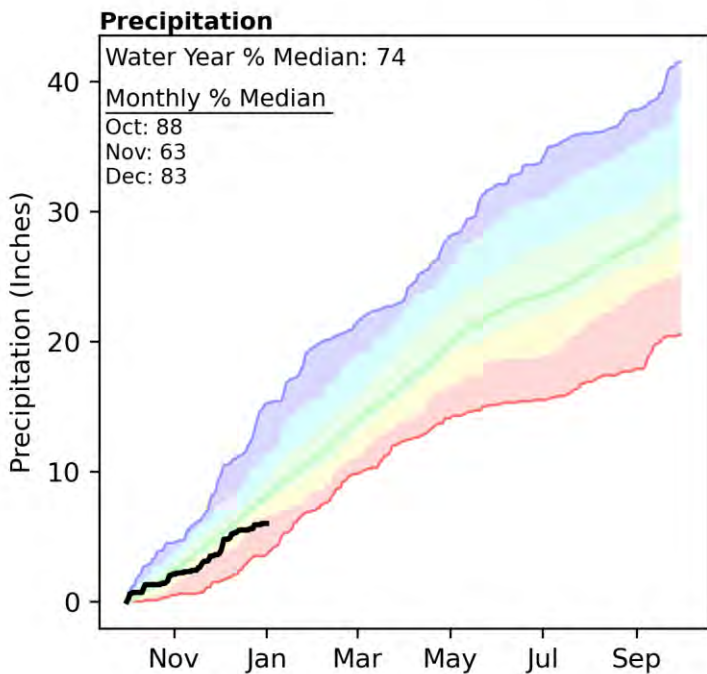
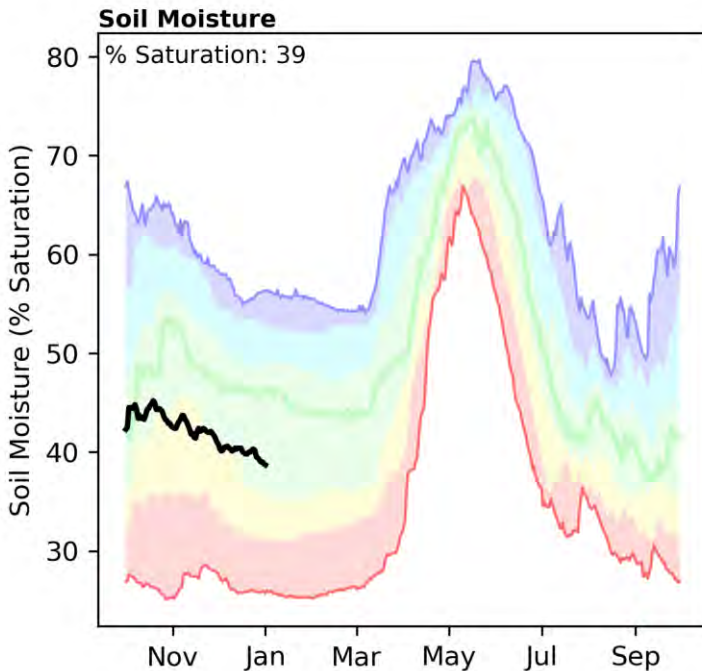
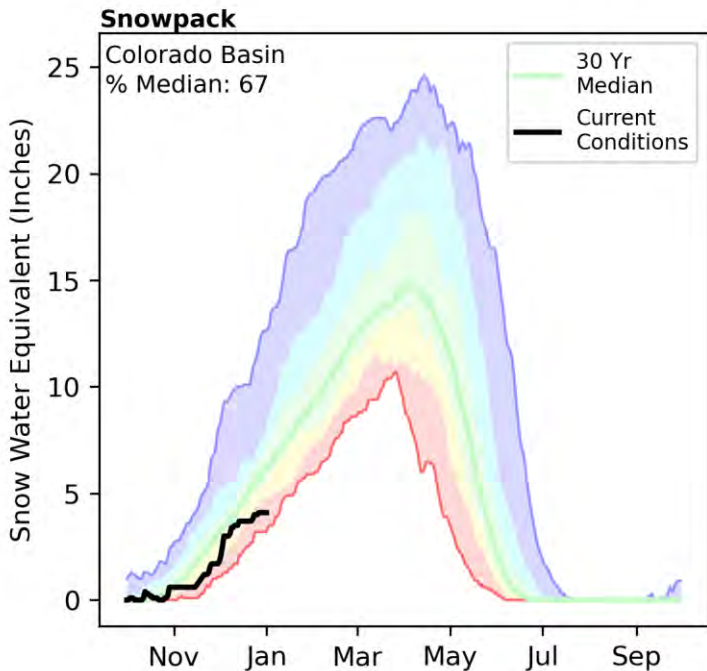
Surprise Valley - Warner Mountains | January 1, 2024

Snowpack in the Surprise Valley - Warner Mountains is below normal at 79% of median, compared to 176% at this time last year. Precipitation in December was well below normal at 64%, which brings the seasonal accumulation (October-December) to 71% of median.



Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
 For more information visit: [30 year normal calculation description](#)

Snowpack in the Colorado Basin above Lake Powell is well below normal at 67% of median, compared to 129% at this time last year. Precipitation in December was below normal at 83%, which brings the seasonal accumulation (October-December) to 74% of median. Soil moisture is at 39% saturation compared to 46% saturation last year. Reservoir storage in the Lower Colorado Basin is 36% of capacity, compared to 27% last year.



Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
For more information visit: [30 year normal calculation description](#)

Appendix: Interpreting the Streamflow Forecast Chart

Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

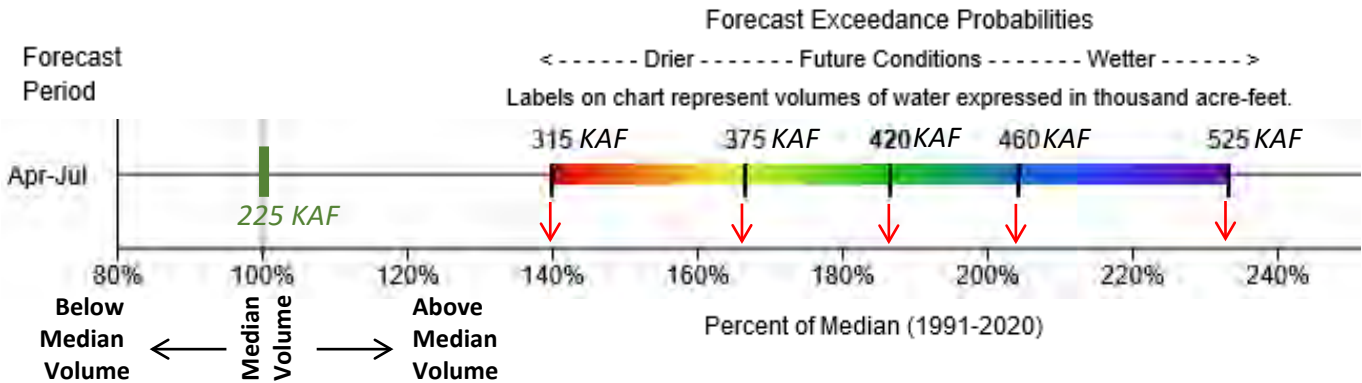
Provided by:
NRCS NV

Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
APR-JUL	315	375	420	187%	460	525	225

The Forecast Chart (below) provides an alternative to the tables (above) used in the basin summaries. The chart displays the forecast exceedance range as a colored bar. The vertical lines on the bar signify the five forecast exceedances.

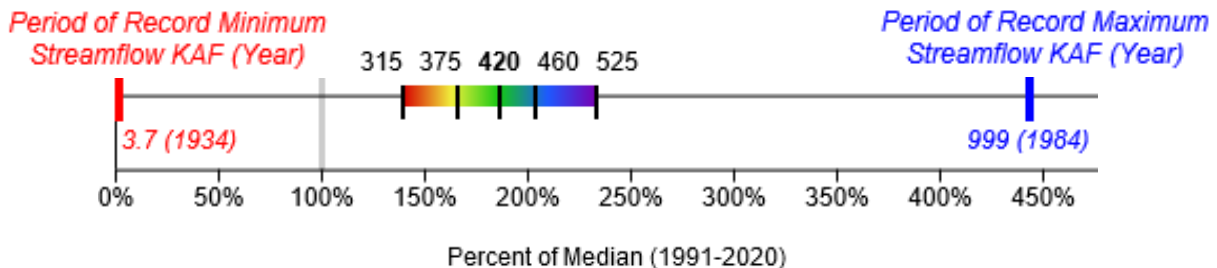


The numbers above the forecast bar are the five exceedance probability volumes in thousand acre-feet (KAF). Each exceedance forecast's percent of median can be estimated by looking at the horizontal axis. The green line and number centered above 100% on the horizontal axis represents the 1981-2010 historical median streamflow for the forecast period in KAF.



In the example above, the entire forecast bar is shifted right of the green bar indicating a forecast for above the median Apr-Jul streamflow of 225KAF. The 50% exceedance is represented by the black line in the green portion of the colored bar. This represents a forecast volume of 420KAF which is ~185% of median. If drier than normal future conditions occur the 70% exceedance forecast may be more likely (375KAF or ~165% of median). If future conditions turn wetter than normal, the 30% exceedance forecast may be more likely (460KAF or ~205% of median). Water users are encouraged to consider the range of forecast exceedances instead of relying solely only on the 50% forecast.

In very wet or dry years forecasts may approach historical records. In these cases the period of record minimum or maximum may be displayed. The minimum is represented by a heavy red line, while the maximum is represented by a heavy blue line. The numbers below the red and blue lines represent the volume in KAF and the year it occurred in parentheses.

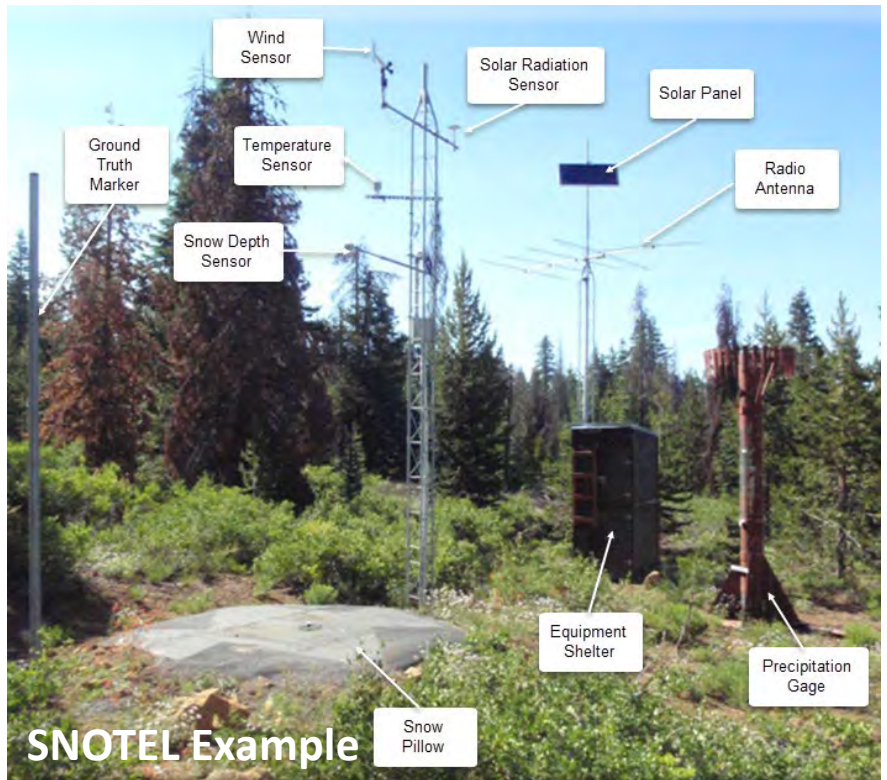


[Click here](#) for an online version which allows users to see averages instead of medians, as well as historic forecasts.

Appendix - SNOTEL and Snow Course Overview

SNOTEL

The NRCS operates an extensive, automated data collection network called SNOTEL (short for Snow Telemetry). SNOTEL sites are designed to operate unattended in remote mountain locations. Data are collected and transmitted hourly and available on the internet. Daily data (midnight values) are quality checked by NRCS hydrologists on at least a weekly basis. SNOTEL sites provide snowpack water content data via a pressure-sensing snow pillow. Other data include snow depth, water year precipitation accumulation, air temperature with daily maximums, minimums, and averages, soil moisture and soil temperature at depths of 2, 8 and 20 inches. The earliest NRCS SNOTEL sites have data back to 1981 or a bit earlier.



Snow Course

Snow courses are measurement transects where snow tubes are used by snow surveyors during the winter season to determine the depth and water content of the snowpack. Hollow snow tubes are used to vertically core the snowpack. The tubes are then weighed to determine the water content of the snow. Generally, snow courses are situated in meadows or forest openings protected from the wind. A snow course measurement is the average of a number of sample points, typically 5 to 10. Snow courses are measured on a monthly basis typically between February 1 and April 1. Snow courses provide a longer record than SNOTEL. The earliest snow courses in the Lake Tahoe and Truckee basins have data back to 1910.



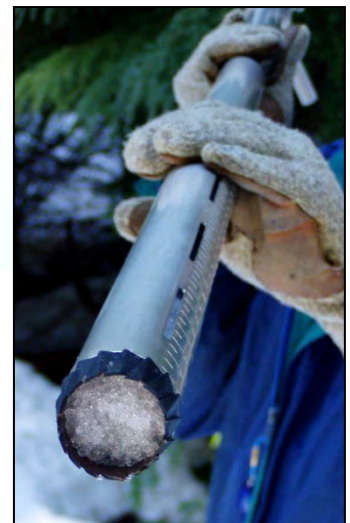
Snow Water Equivalent (SWE):

Sometimes also called snow water content, this is the amount of water contained within the snowpack. It can be thought of as the depth of water (in inches) that would result if you melted the snowpack. For example, if the snowpack was contained 12 inches of SWE, then when melted there would a puddle of water 12 inches deep on the ground.

SWE measurements made by snow pillows or snow tubes rely on the fact that water weighs the same whether it is liquid or frozen.



Weight of frozen water = Weight of liquid water



Snow core inside snow tubes

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AND SOIL MOISTURE, RESERVOIR, SURFACE
WATER SUPPLY INDEX, AND OTHER DATA BY
VISITING OUR WEB SITE:
<https://www.nrcs.usda.gov/resources/data-and-reports/california-snow-survey>



California Water Supply Outlook

