



Natural Resources Conservation Service

Nevada Water Supply Outlook Report

May 1, 2023



Photo Credit: Jeff Anderson

West Walker River flowing through Leavitt Meadow - April 21, 2023

The record-breaking snowpack in the Walker and Carson basins is forecast to set all-time runoff volume records this spring. NRCS snow surveyors visited Leavitt Meadows SNOTEL on April 21 and measured 5.5 feet of snow depth, containing 32.3 inches of water content. This site is normally snow free on April 18. Later in the day, the surveyors headed higher into the mountains to Leavitt Lake SNOTEL where there was over 20 feet of snow, containing 117 inches of water content. Snow at Leavitt Lake SNOTEL will likely persist until late July or beyond.

Background information about this report:

This report provides an analysis of water supply conditions across Nevada and a part of the eastern Sierra in California. It is published monthly from January to May. First of month data are summarized and used to forecast summer streamflow. The report is best read in digital format which allows readers to click on the blue internet links.

Streamflow Forecasts: Most of the annual streamflow in the western United States originates as snowfall that accumulates in the mountains during the winter. As the snowpack accumulates, hydrologists can estimate the runoff that will occur when the snow melts. Measurements of [snow water equivalent \(SWE\)](#) at snow courses and SNOTEL sites, along with precipitation, antecedent streamflow, and El Niño / Southern Oscillation indices are used in computerized statistical models to produce streamflow runoff forecasts. **Forecasts in this report give the total volume of water expected to flow past a location during a specified period, such as April 1 to July 31.**

Most **streamflow forecast volumes** in this report are expressed in KAF (thousand-acre-feet). Some smaller streams are forecast in acre-feet and noted as such in parentheses after the forecast name, such as “Marlette Lake Inflow (acre-feet)”. Forecasts for Lake Tahoe, Pyramid Lake and Walker Lake are expressed in feet of water surface elevation change during the forecast period. A rise in lake level is indicated by a positive value, while a drop caused by evaporation is indicated by a negative number. The East Fork Carson River has two recession forecasts that provide the dates when spring river flows are expected to recede to 500 cfs and 200 cfs levels as the snowmelt decreases in late spring.

Interpreting Streamflow Forecasts: Forecasts of any kind are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast. There is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. **Unless otherwise stated the 50% exceedance forecast is the one referred to in the text of this report.** To quantify the range around this 50% value, four other forecasts are provided in the forecast tables, two smaller values (90% and 70% exceedances) and two larger values (30% and 10% exceedances). There is a 90% chance that the actual flow will be more than the minimum forecast (90% exceedance forecast). Likewise there is a 10% chance the actual flow will be more than the maximum forecast (10% exceedance forecast). Other forecasts can be interpreted similarly. The wider the spread between these values, the more forecast uncertainty.

As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the

range around the 50% exceedance probability forecast. Water users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water perhaps due to a dry climate outlook for the coming months, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water, for example if there is a threat of flooding, they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose, they should be prepared to deal with either more or less water.

Streamflow Adjustments: Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream lakes, reservoirs and diversions. Certain forecasts are adjusted for these structures; these are footnoted with a (2) in the report. A summary list of all streamflow adjustments is provided on the back cover of this report.

“Normal” = Median: Starting in water year 2022 the NRCS selected the statistical median for the 1991-2020 period as the default central tendency for all parameters including snowpack, precipitation, soil moisture, streamflow and reservoir storage. Unless otherwise stated all percentages in this report are based on median. For more information about the 1991-2020 normals and how they impact our region visit the [Nevada Normals Dashboard](#).

Soil moisture has been measured at SNOTEL sites since ~2006. Due to the short record the soil moisture normal is based on water years 2006-2020. Soil moisture data are depth averaged from sensors located at soil depths of 2, 8, and 20 inches.

Maximums and Minimums: Graphs in this report display “Max” and “Min” lines for snowpack, precipitation and soil moisture. For snow and precipitation these are basin-wide, daily maximums and minimums for water years 1981-2021; for soil moisture the period is 2006-2021.

Watershed Snowpack Analysis: These tables summarize the snowpack percent of median for each basin and its sub-basins. Percentages are based on SNOTEL and snow course measurements. Basin snowpack files are [available here](#). Select “Nevada” and report type “Snow” a full report with station-by-station data. Basin order is alphabetical by main basin, followed by its sub-basins, then the next main basin.

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Nevada Water Supply Outlook

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SUMMARY

This winter's record-breaking snow accumulation finally relented in April allowing the snowpack to ripen and begin to melt. Snow water content peaked between April 7-10 with amounts ranging from 149-382% of normal. April's sunny skies and near record temperatures towards the end of the month ramped up snowmelt allowing a few of the lowest elevation SNOTEL sites across the state to melt out by May 1. This means most of the snow below the SNOTEL network is now gone. May 1 basin snow water amounts are 178-380% of median. A great deal of snow remains at higher elevations and melt will continue into June and July at the deeper locations. Water year precipitation is 115-204% of median. Most SNOTELs south of Interstate 80 have recorded October through April precipitation totals that rank above the 90th percentile compared to historic data. Nearly all streamflow forecasts for May-July period are more than twice median and one-third of the forecasts are for more than five times median. NRCS streamflow forecasts are intended for water supply planning, they provide a total volume of runoff expected during the spring snowmelt runoff period. The potential for flooding this spring is likely, however the NRCS seasonal forecasts are volumetric and do not provide guidance on peak discharge magnitude or timing. To track flooding potential, use the 5-day forecasts on the [NOAA California-Nevada River Forecast Center website](#) and click on the stream gage of interest.

SNOWPACK

Winter 2023 produced one of the biggest snowpacks ever measured across the Sierra Nevada, the Great Basin and the Colorado basin. [April 1 snow measurements set new records](#). Table 1 shows basin snow water peaked between April 7-10, which was one to two weeks later than normal in most basins. Peak amounts were 213-305% of median in the Sierra basins, 157-226% across northern Nevada, 382% in the Spring Mountains and 149% in the Upper Colorado. The Carson and Walker basin snowpacks broke all-time records based on SNOTEL data back to 1981. Peak amounts were second highest in the Upper Humboldt, Lake Tahoe and Truckee basins, as well as in Eastern Nevada. The Lower Humboldt and Owyhee snowpack ranked third highest. The Upper Colorado Basin's peak snow water tied 1997 for the best winter since 1986. May 1 basin snowpacks remain high at 178-380% of median. These amounts are [above 90th percentile](#) at most SNOTELs. Based on basin-wide snow water amounts on May 1 ~20-40% of this winter's snowpack has already melted. Most of this melt occurred at lower elevations. [Higher elevation SNOTELs](#), above 8,500 feet elevation, have lost less than 10-20% of their seasonal snow water to melt. Figure 1 shows that the Walker basin still has more snow on May 1 than the maximum snow water measured in 2017. The [Interactive SNOTEL Charts](#) can be used to see at other basins.

Figure 1: Snow water equivalent in the Walker Basin

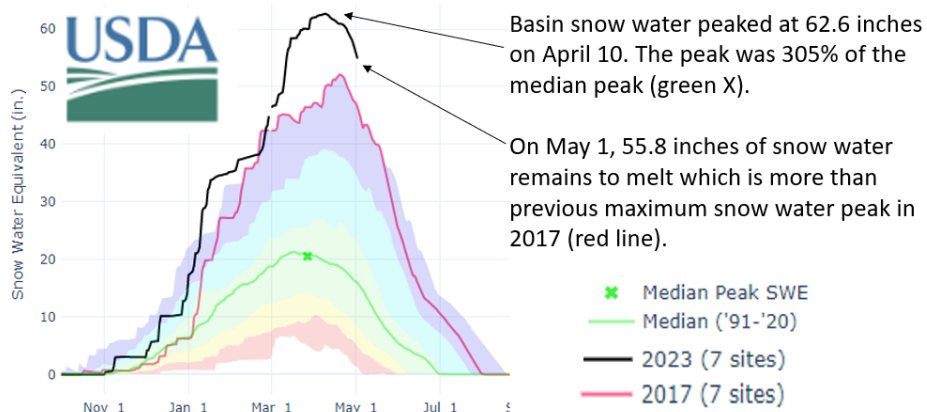


Table 1: Peak snow water summary by basin for winter 2023 based on the [Interactive SNOTEL Charts](#).

Basin	2023 Peak SWE (in)	Median Peak SWE (in)	2023 Peak as Percent of Median Peak	2023 Peak Date	Median Peak Date	# Days 2023 Peak from Median Peak	May 1 SWE (in)	Percent of 2023 Peak SWE remaining May 1
Lake Tahoe	59.2	27.0	219%	9-Apr	28-Mar	+12	45.4	77%
Truckee	56.8	26.7	213%	9-Apr	27-Mar	+13	44.1	78%
Carson	59.0	20.8	284%	9-Apr	27-Mar	+13	48.7	83%
Walker	62.6	20.5	305%	10-Apr	27-Mar	+14	55.8	89%
Northern Great Basin	24.0	14.0	171%	9-Apr	28-Mar	+12	13.4	56%
Upper Humboldt	27.2	14.2	192%	8-Apr	2-Apr	+6	17.5	64%
Lower Humboldt	27.8	14.9	187%	9-Apr	27-Mar	+13	16.2	58%
Clover Valley	34.0	15.7	217%	8-Apr	31-Mar	+8	23.5	69%
Snake	24.4	15.5	157%	8-Apr	30-Mar	+9	18.6	76%
Owyhee	20.8	12.3	169%	8-Apr	19-Mar	+20	10.0	48%
Eastern Nevada	29.1	12.9	226%	9-Apr	1-Apr	+8	21.7	75%
Spring Mountains	25.6	6.7	382%	7-Apr	5-Mar	+33	3.7	14%
Upper Colorado	23.9	16.0	149%	7-Apr	5-Apr	+2	19.1	80%

PRECIPITATION

After five months of above normal precipitation, April saw below normal amounts ranging from 26-80% of median. Water year precipitation is 114-204% of median and ranks [above the 90th percentile](#) for most SNOTELs south of Interstate 80. A few stations in Carson, Walker and Humboldt Basin have seen their [greatest October-April precipitation](#) totals on record, exceeding what was measured to this point in 2017. Most of the other SNOTELs in the Carson and Walker basin are second highest behind 2017. This winter's struggle with snow plugging precipitation gages was solved by April's sunny days, warmer temperatures, and a few days of field visits by NRCS staff. Now that the plugs have registered daily precipitation amounts have been redistributed across the period when each gage was plugged and water year accumulation amounts are accurate.

SOIL MOISTURE

Snowmelt increased soil moisture to near normal or above normal levels at most SNOTEL sites. Farmers in the Lovelock area, however, report extremely dry soils in their fields after not having water to irrigate last season. Soil moisture graphs found later in this report represent conditions in the mountains (not the valleys) and average data from sensors located at soil depths of 2, 8 and 20 inches for all the SNOTELs in a basin. SNOTEL soil moisture data has a short period of record and graphs in this report are based on data since October 2005.

RESERVOIRS

In the Truckee Basin, Stampede, Prosser, and Boca reservoirs are all expected to fill. Storage in Boca and Prosser reservoirs is being maintained at flood control levels until final fill can occur closer to the end of the melt season. Stampede Reservoir continues to fill and has another 45kaf of space before reaching its flood control level. Lake Tahoe's water level could rise to within a few inches of its legal limit based on current forecasts but may not fill to its legal limit. In the Carson Basin, there is more than enough water to fill Lahontan multiple times. Mangers have drawn Lahontan down and excess water is being released into the

desert using [infrastructure built in 2017](#). Managers in the Walker basin have also drawn down Topaz and Bridgeport reservoirs and both will fill once peak flows pass. In the Lower Humboldt Basin water is being released from Rye Patch Reservoir to allow irrigators to wet the soil profile in their fields which are extremely dry after not having water to irrigate last season. Due to this, Rye Patch storage decreased slightly from last month, but that will turn around as inflow increases. In the Owyhee Basin, Wildhorse Reservoir is unlikely to fill based on streamflow forecasts. In the Colorado basin, combined storage in Lake Mead and Lake Powell increased by 429 kaf in April. Lake Powell inflow is forecast for another 9,120 kaf based on the May-July forecast. The Colorado basin hasn't seen a snowpack this large since 1997, but it would take a string of similar winters to refill these reservoirs. Monthly storage changes for reservoirs across the state can be tracked [here](#).

STREAMFLOW FORECASTS

May 1 streamflow forecasts continue to be high statewide. Nearly all streamflow forecasts for May-July period are more than twice median and one-third of the forecasts are for more than five times median. The median is the middle value of the dataset and represents a volume that is exceeded half the years. A forecast for 300% of median means the total streamflow volume during the May-July period is expected to be three times the median. It is important to focus on the volume and not just the percentage. Comparing volumes to past years provides perspective. Table 2 highlights each forecast that has exceedance volumes that break the standing record for May-July streamflow volume. With all-time record snowpacks melting in the Carson and Walker basins, streams in these basins have the best chance of setting new records.

Table 2: April-July streamflow forecast volumes which exceed record April-July volumes.

Forecast Point	Forecast Period	May 1, 2023 Forecast Exceedances - KAF ←---drier future-----wetter future--->					Record KAF	Record Year
		90%	70%	50%	30%	10%		
Lake Tahoe Net Inflow	May-Jul	270	305	325	345	380	376	1907
Galena Creek	May-Jul	6.5	7.2	7.7	8.2	8.9	8.3	1996
EF Carson R nr Gardnerville	May-Jul	420	435	450	465	480	413	2017
WF Carson R at Woodfords	May-Jul	118	125	130	135	142	124	1983
Kings Canyon Creek	May-Jul	0.83	0.99	1.1	1.22	1.41	1.3	1983
Ash Canyon Creek	May-Jul	2.2	2.4	2.6	2.8	3.1	2.7	1983
Carson R nr Carson City	May-Jul	480	505	520	535	560	486	2017
Carson R nr Fort Churchill	May-Jul	485	505	520	530	550	470	2017
E Walker R nr Bridgeport	May-Aug	224	233	240	247	256	179	1983
W Walker R bk L Walker R nr Coleville	May-Jul	390	405	415	425	440	366	2017
W Walker R nr Coleville	May-Jul	370	385	395	405	420	343	2017
Lamoille Creek	May-Jul	39	44	48	52	57	48	1997
SF Humboldt abv Tenmile Ck	May-Jul	113	127	136	145	159	141	2005

Forecast Volume Equals or Exceeds Existing Record

Forecasting streamflow for the Humboldt River is challenging this year since there are not a lot of comparison years that flip-flopped from so dry to so wet. The abundant low elevation snow measured last month has now melted off. Observed streamflow volumes in April ranked near to above the 90th percentile for the NF Humboldt, SF Humboldt, Rock Creek and for the mainstem of the Humboldt River at Carlin and Palisade. As higher elevation snowmelt really kicks in the [NRCS Snow-to-Flow charts](#) are a useful tool that allow users to compare this year's

snowmelt and hydrograph to other years. In the Humboldt basin, a good set of years to watch is 1981, 1982 and 1983. Water year 1981 had low snow (56%), while 1982 flipped and had a very good snowpack (157%). This year's snowpack exceeded 1982, but the 2022 runoff was not as good as 1981. 1983 had a near record snowpack (174%) and April-July volumes were up to three times those measured in 1982. Figure 5 provides an example snow-to-flow plot for the Humboldt River at Palisade which shows that so far 2023 compares well with 1982. April streamflow at Palisade was 96 kaf, higher than April 1982 when 88kaf was measured. Table 3 summarizes this month's May-July forecast exceedances versus May-July observed flows for 1982, 1983 and 2019 for Humboldt River mainstem points. This month's forecast volumes are greater than 1982 but mostly less than 1983. Volumes in 2019 fall in between, so this is another good comparison year to track. History shows a wide variety of outcomes are possible. Spring precipitation will play a big role in where this year's volume falls. 1982 had a drier than normal spring and lacked a pronounced streamflow peak. 2019 had a wet spring and a higher peak streamflow.

Figure 5: Humboldt River at Palisade snow-to-flow graph comparing streamflow to snow water equivalent for SNOTELs used in the NRCS streamflow forecast for water years 2023 and 1982.

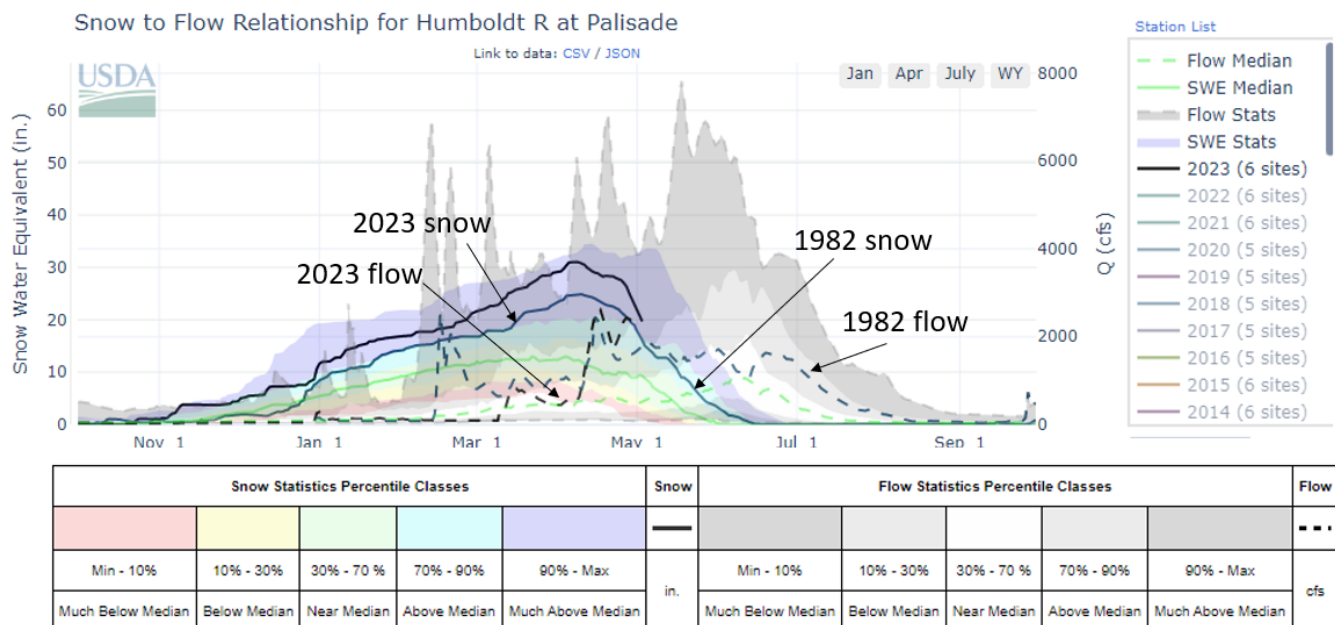


Table 3: Humboldt River May-July forecast volumes compared to 1982, 1983 and 2019 volumes.

Forecast Point	Forecast Period	May 1, 2023 Forecast Exceedances - KAF					1982 KAF	2019 KAF	1983 KAF
		<---drier future-----wetter future--->							
		90%	70%	50%	30%	10%			
Humboldt R nr Elko	May-Jul	168	196	215	234	262	153	226	229
Humboldt R at Palisades	May-Jul	302	356	395	436	501	228	374	455
Humboldt R nr Comus	May-Jul	224	276	315	356	422	189	310	548
Humboldt R nr Imlay	May-Jul	197	250	290	333	401	158	212	497

Greater than 1982

Greater than 2019

Greater than 1983

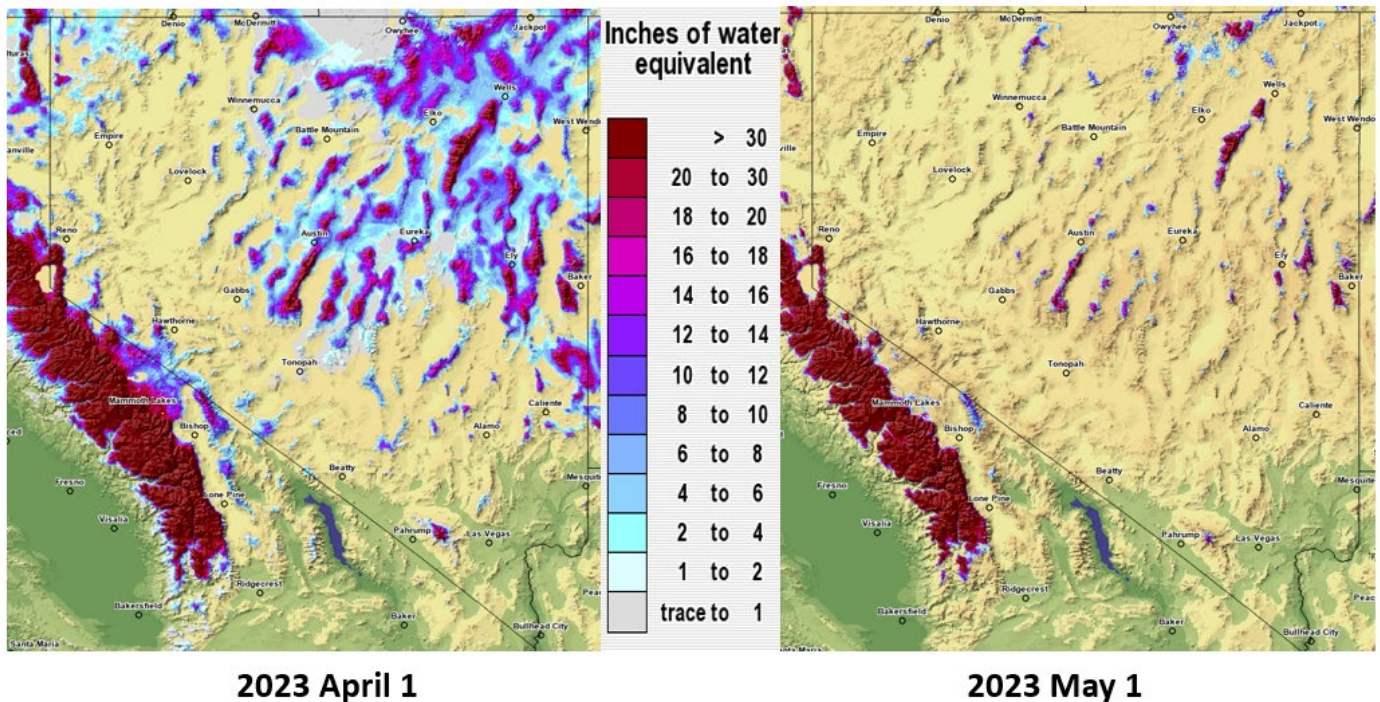
RANGELAND CONDITIONS

The NRCS mission is to provide resources to farmers and ranchers to aid them with the management of their land. Most NRCS SNOTEL stations are located in the mountains above 6,500 feet. There are many millions of rangeland acres below the SNOTEL network. This section takes a closer look at data from lower elevation rangeland and valley locations that may be especially useful to rangeland users.

Seasonal snow cover replenishes soil moisture and provides water for plant growth. A useful tool to track the lower elevation snowpack is [NOAA's Modeled Snow Water Equivalent Map](#). The April 1, 2023 map (left) shows modeled snow water equivalent across Nevada one month ago. Comparing to May 1, 2023 (right) shows that the lowest elevation snow melted during the month of April leaving significant snow at higher elevations.

Figure 5: Modeled snow water content across Nevada 3/1/23 (left) vs 4/1/23 (right), source: NOAA

NOAA Modeled Snow Water Equivalent



Plant Growth: Plant green-up is progressing across the state below the snow line. Native wildflowers are blooming at low to mid-elevations. The native shrub, desert peach (*Prunus andersonii*) is providing a beautiful display of pink flowers in western Nevada. Other early growing shrubs such as bud sagebrush (*Picrothamnus desertorum*) and spiny hopsage (*Grayia spinosa*) are also in flower. Native perennial bunchgrasses (needlegrasses, squirreltail, basin wildrye) received much needed winter moisture across Nevada and are getting a slow start due to colder than normal temperatures. Cheatgrass (*Bromus tectorum*) is starting to set seed at lower elevations where moisture was available across the state and some hillsides are turning reddish-purple.

Temperature and Precipitation: Table 4 provides a summary of temperature and precipitation data from selected valley climate stations across the state for the month of April. April was below normal for temperature in the northern half of Nevada with the southern stations slightly above normal. All stations recorded below normal precipitation. The maximum temperature for the month at Reno was 86°F with a monthly low of 24°F.

Elko had an April high of 85°F and low of 16°F. The highest temperature in April was 98°F at the Las Vegas airport climate station with a low of 40°F.

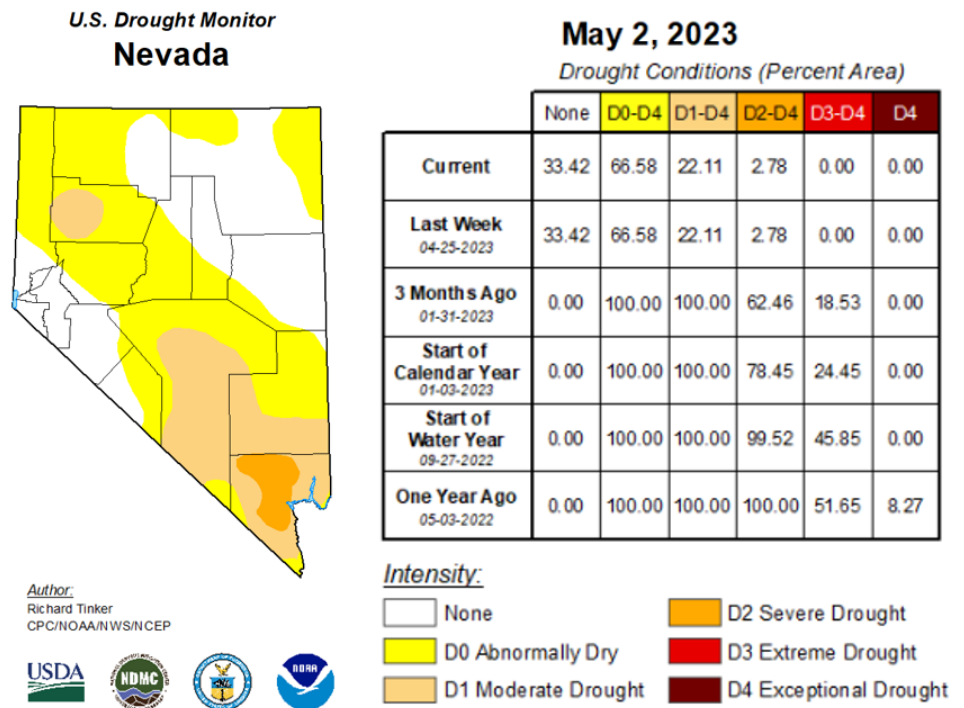
Table 4: March summary of valley climate stations, source: <http://www.rcc-acis.org/>

Climate Station	April Average Temperature °F	April Temperature Departure from Normal °F	April Precipitation (Inches)	April Precipitation Departure from Normal (inches)	Normal April Average Temperature °F	Normal April Precipitation (inches)
Reno airport	52	+0.4	0.18	-0.26	51.6	0.44
Orovada	46.2	-0.5	0.36	-0.92	46.7	1.28
Winnemucca	46.4	-1.2	0.26	-0.74	47.6	1.00
Elko airport	44.6	-1	0.14	-0.91	45.6	1.05
Ely	41.7	-1.5	0.22	-0.85	43.2	1.07
Eureka	42.9	-0.6	0.18	-0.90	43.5	1.08
Tonopah Airport	49.9	0	0.01	-0.28	49.9	0.29
Overton	65.2	-1.5	0.05	-0.26	66.7	0.31
Las Vegas airport	68.6	+2.2	0.01	-0.22	66.4	0.23
Mina	54.2	-0.5	0	-0.57	54.7	0.57
HIKO	54.3	0	0.04	-0.43	54.3	0.47
Minden	46.9	-0.2	0.01	-0.48	47.1	0.49
Mercury 3	60	+0.3	0.16	-0.21	59.7	0.37
Yerington	49.6	-1.8	0.03	-0.30	51.4	0.33

Drought Status:

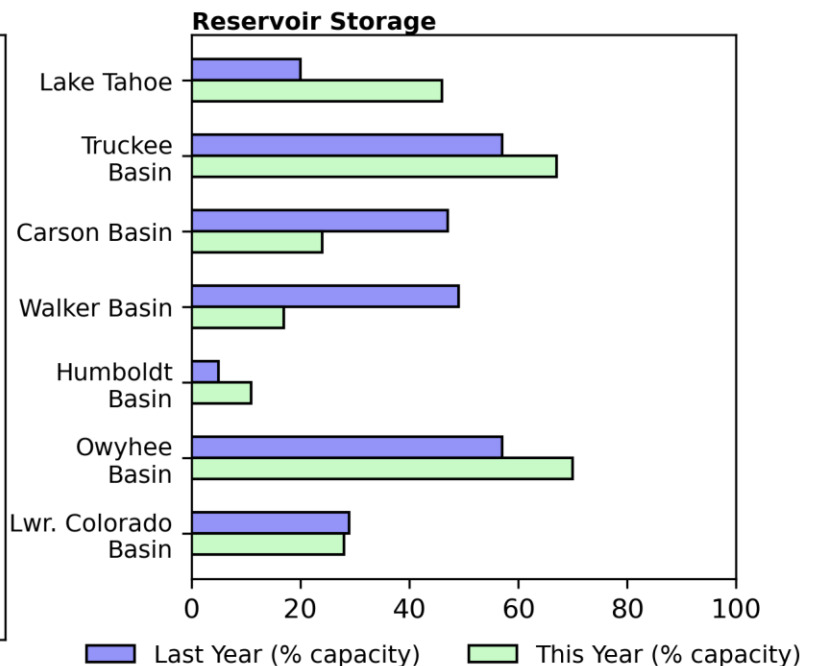
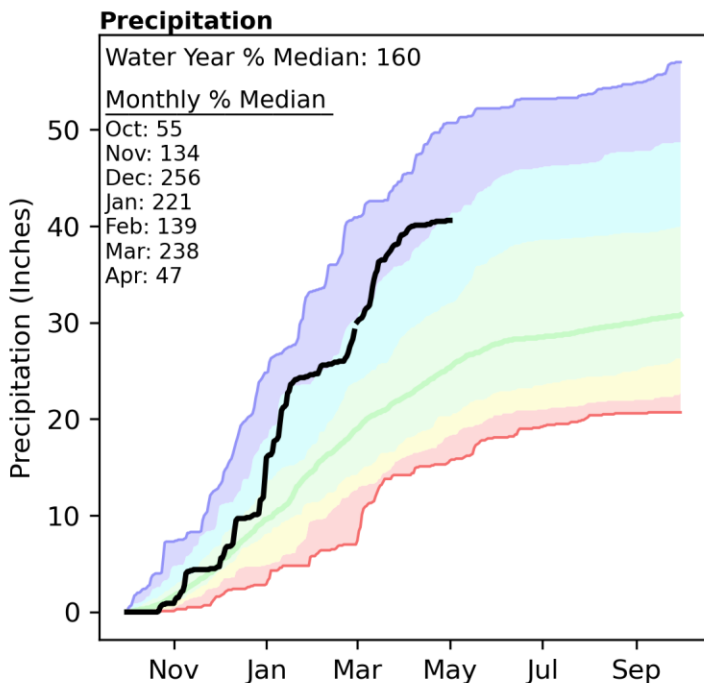
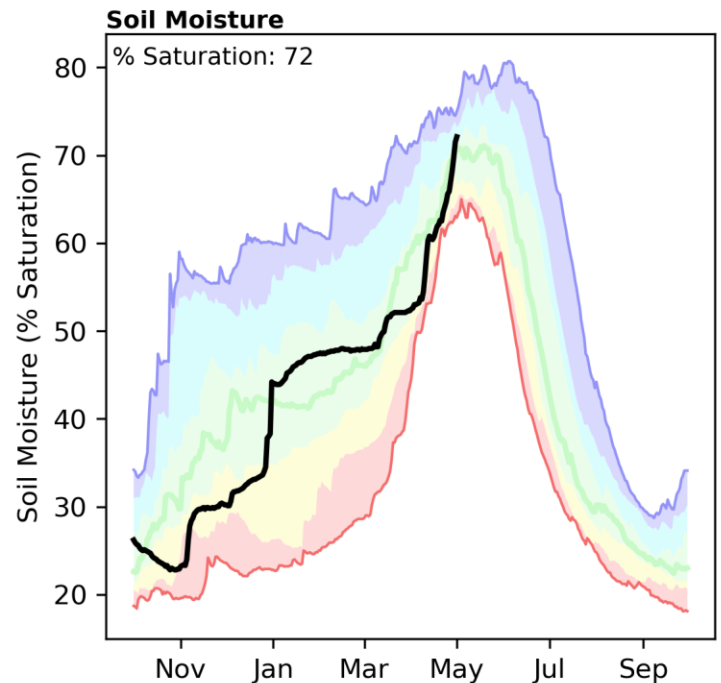
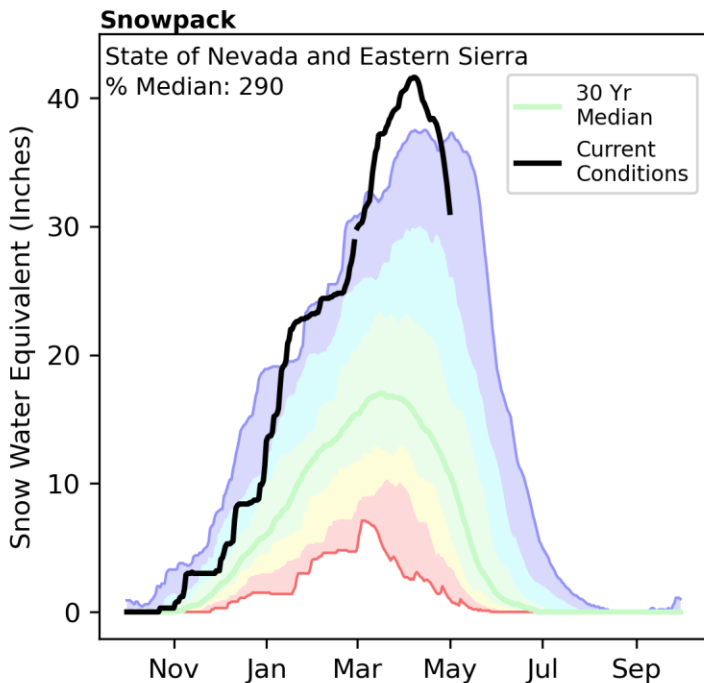
The current U.S. Drought Monitor indicates one-third of Nevada is out of drought. Less than 3% of Nevada is classified as D2 (severe drought). The remainder of the state is classified as either D0 (abnormally dry) or D1 (moderate drought). At the start of the water year the entire state was classified as D2 or D3 (severe to extreme drought). Drought impacts on summer pastures and riparian areas should be considered when grazing planning for the 2023 season. May and June moisture will be critical to improve soil moisture and increase plant production potential for the 2023 growing season.

Figure 6: US Drought Monitor Map <https://droughtmonitor.unl.edu>

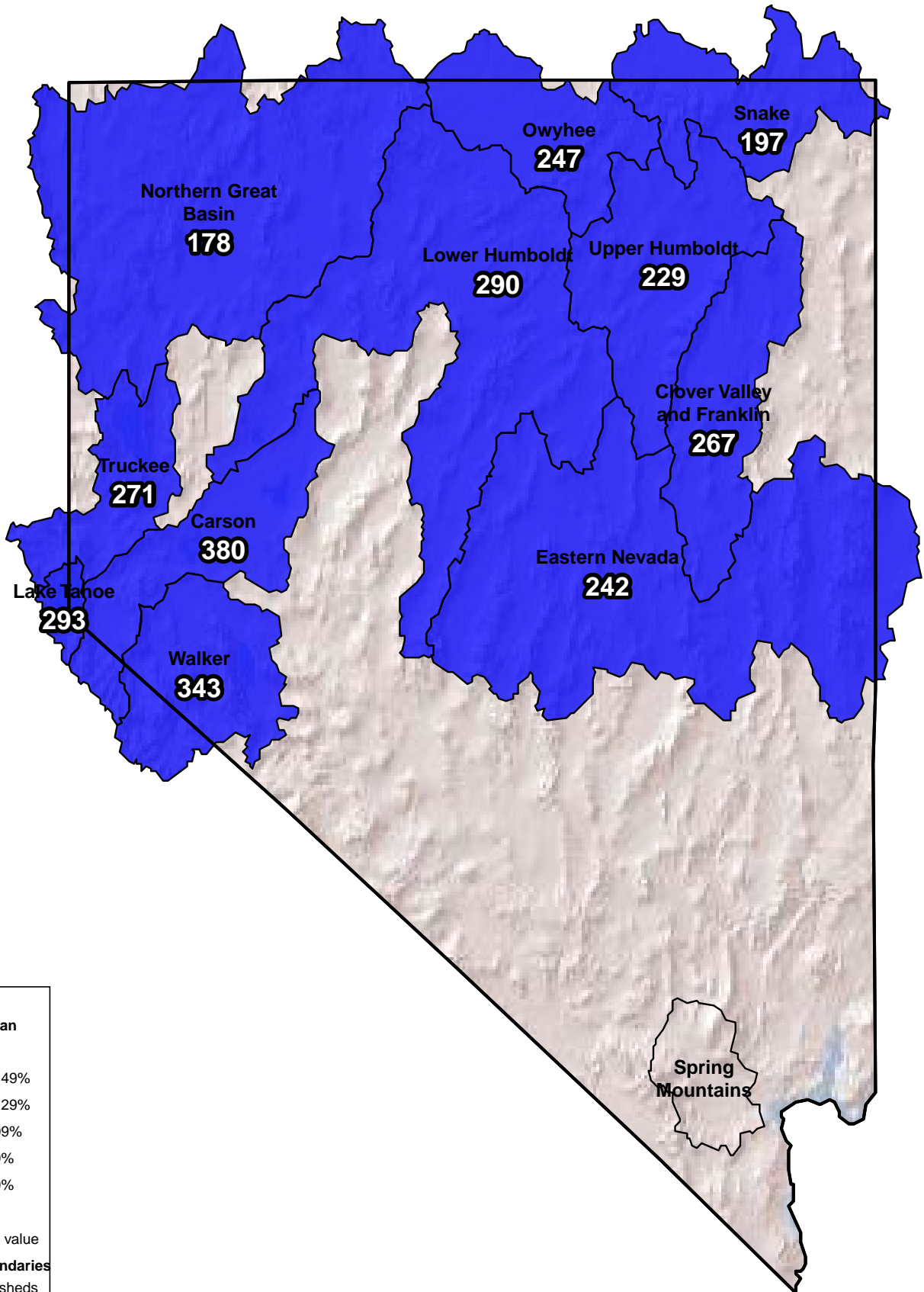


State of Nevada and Eastern Sierra | May 1, 2023

Snowpack in the State of Nevada and Eastern Sierra is well above normal at 290% of median, compared to 61% at this time last year. Precipitation in April was well below normal at 47%, which brings the seasonal accumulation (October-April) to 160% of median. Soil moisture is at 72% saturation compared to 71% saturation last year.



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



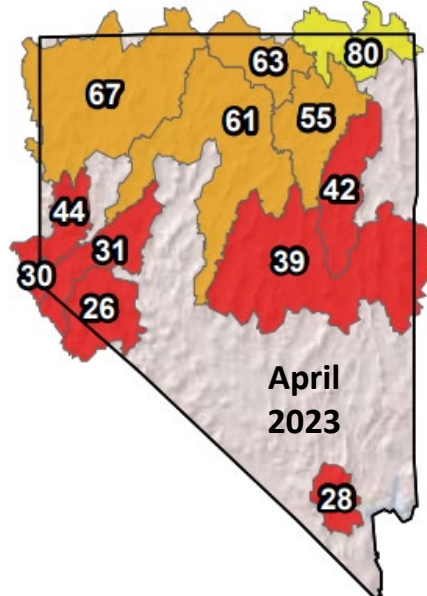
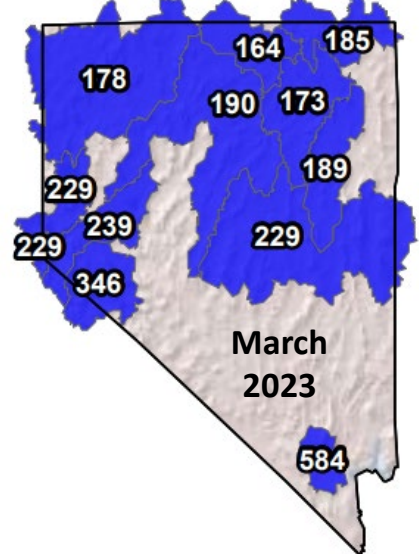
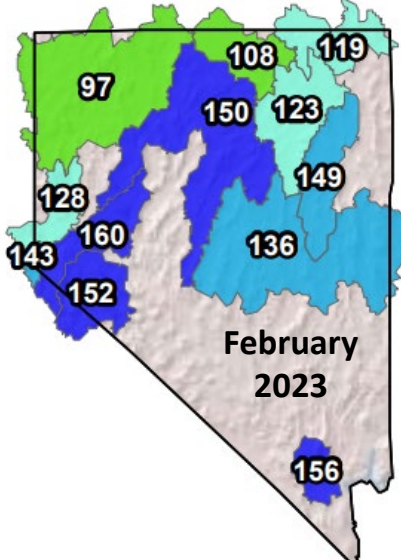
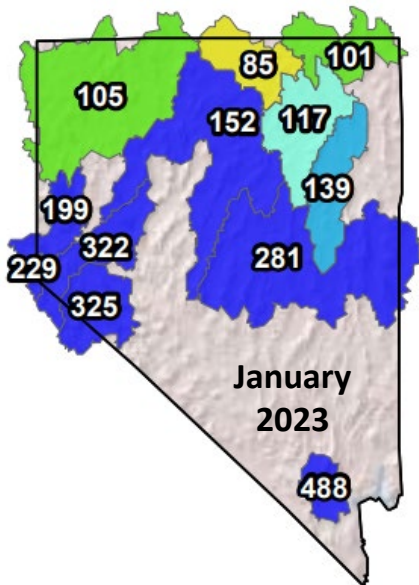
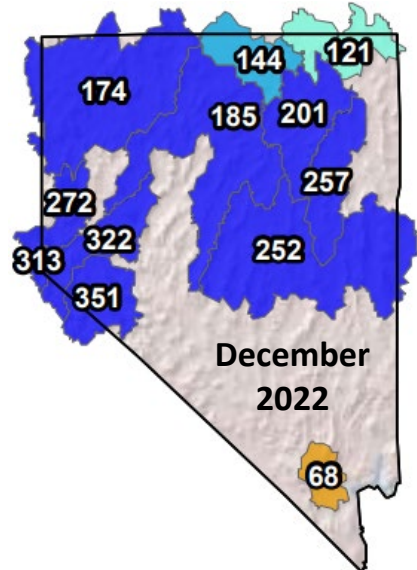
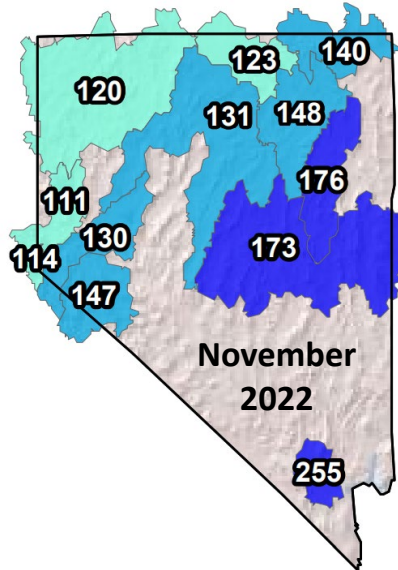
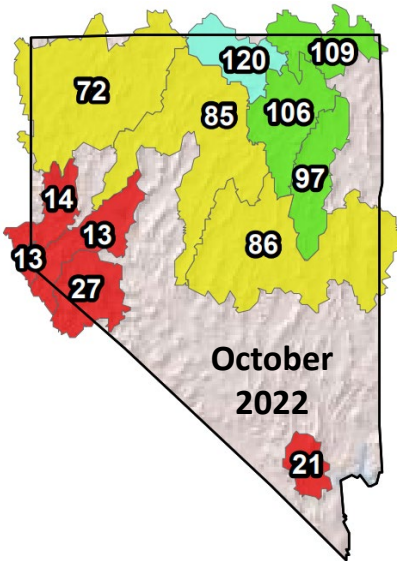
Percent NRCS 1991-2020 Median

- ≥ 150%
- 130% - 149%
- 110% - 129%
- 90% - 109%
- 70% - 89%
- 50% - 69%
- < 50%
- No basin value

Watershed Boundaries

- State Watersheds

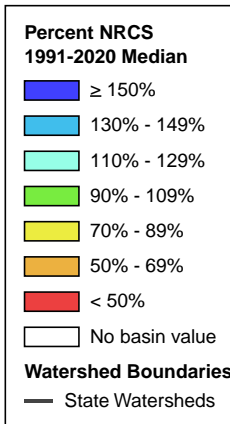
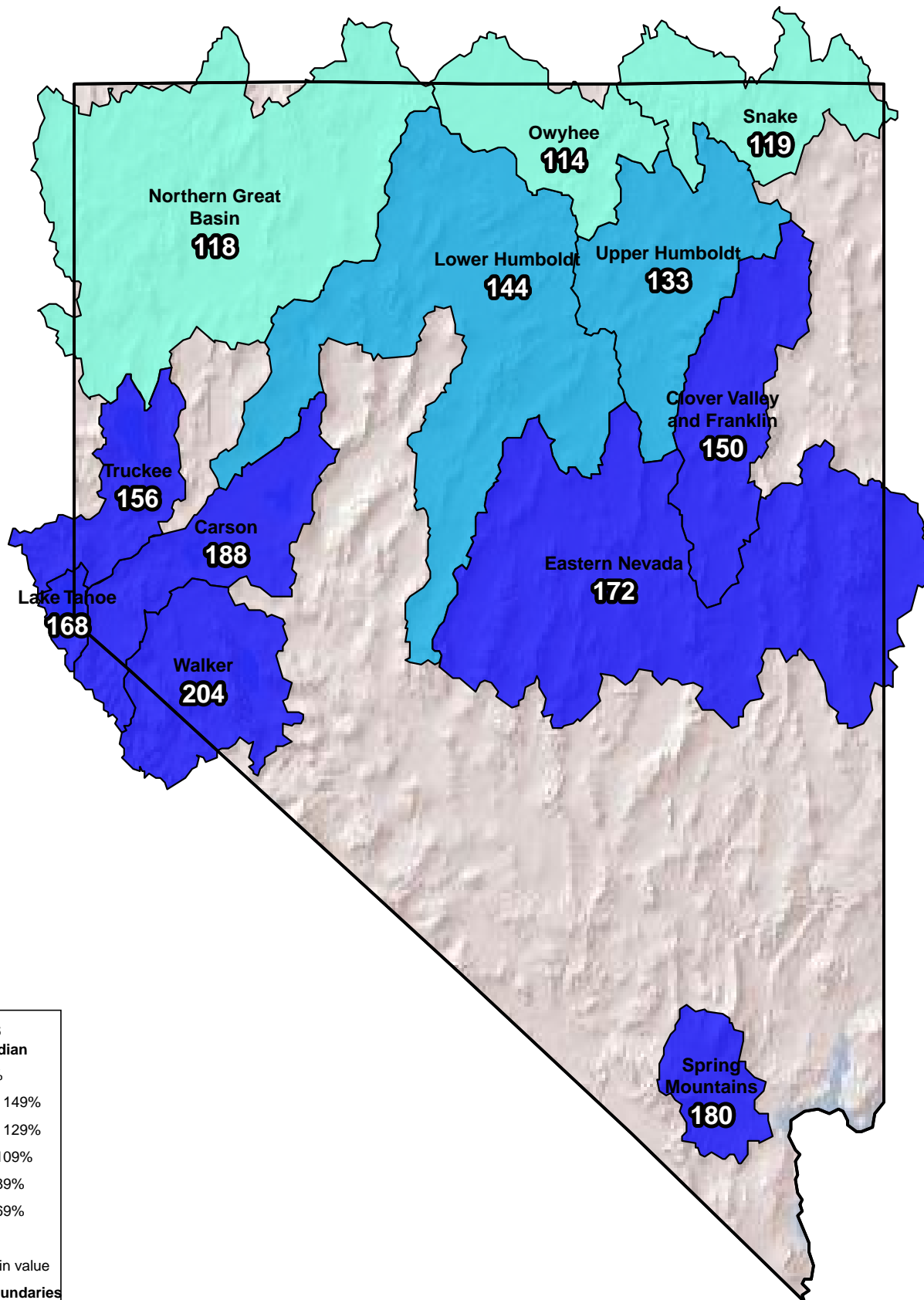
Monthly Precipitation as Percent of Median – Water Year 2023



Monthly Precipitation as a Percent of Median
Based on NRCS SNOTEL data compared to 1991-2020 median

- ≥ 150%
- 130% - 149%
- 110% - 129%
- 90% - 109%
- 70% - 89%
- 50% - 69%
- < 50%
- No basin value

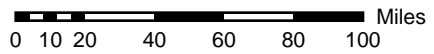
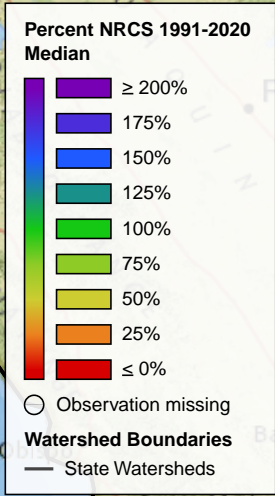
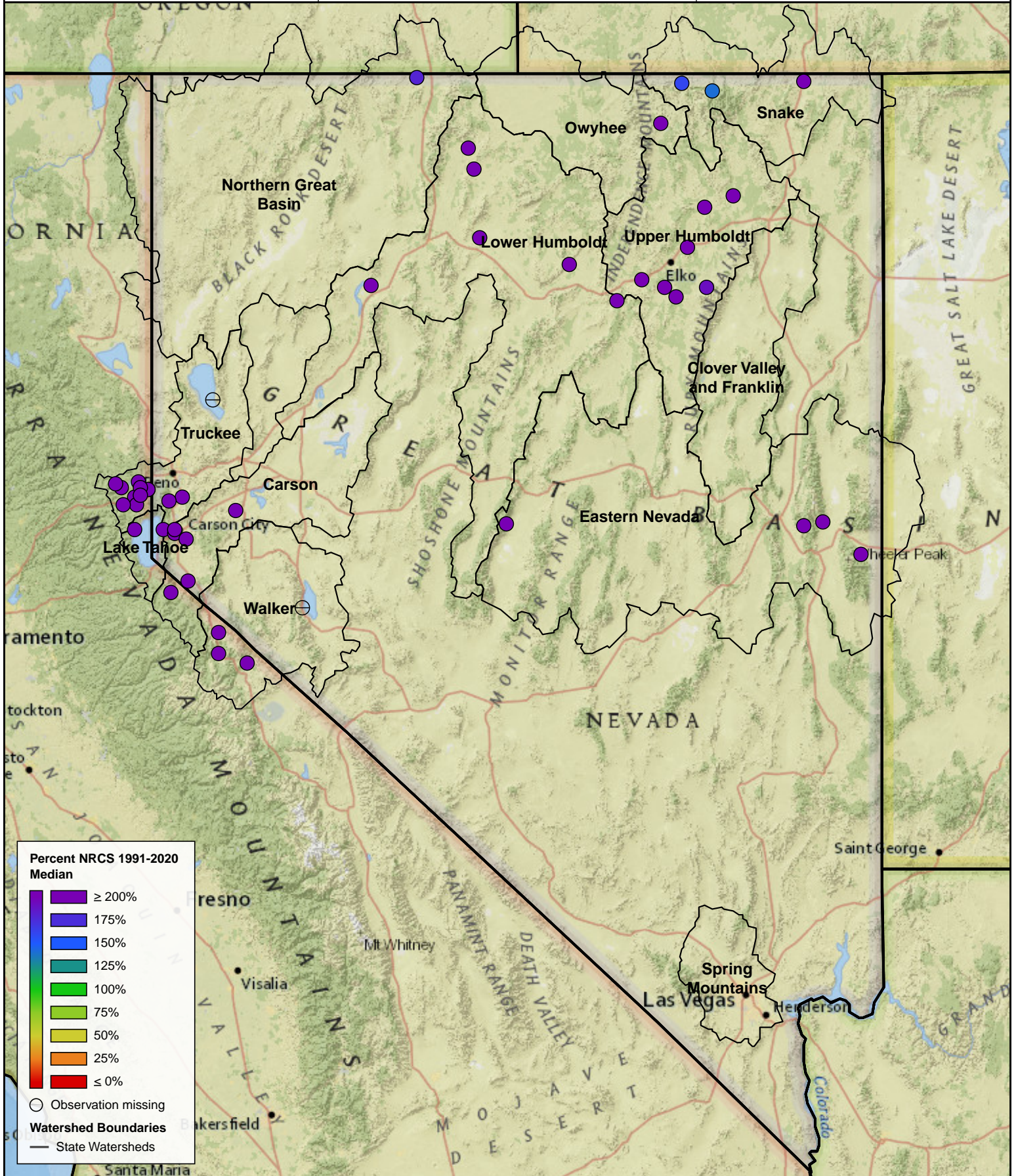




Streamflow Forecast Volume
50% Exceedance Probability

Percent NRCS 1991-2020 Median

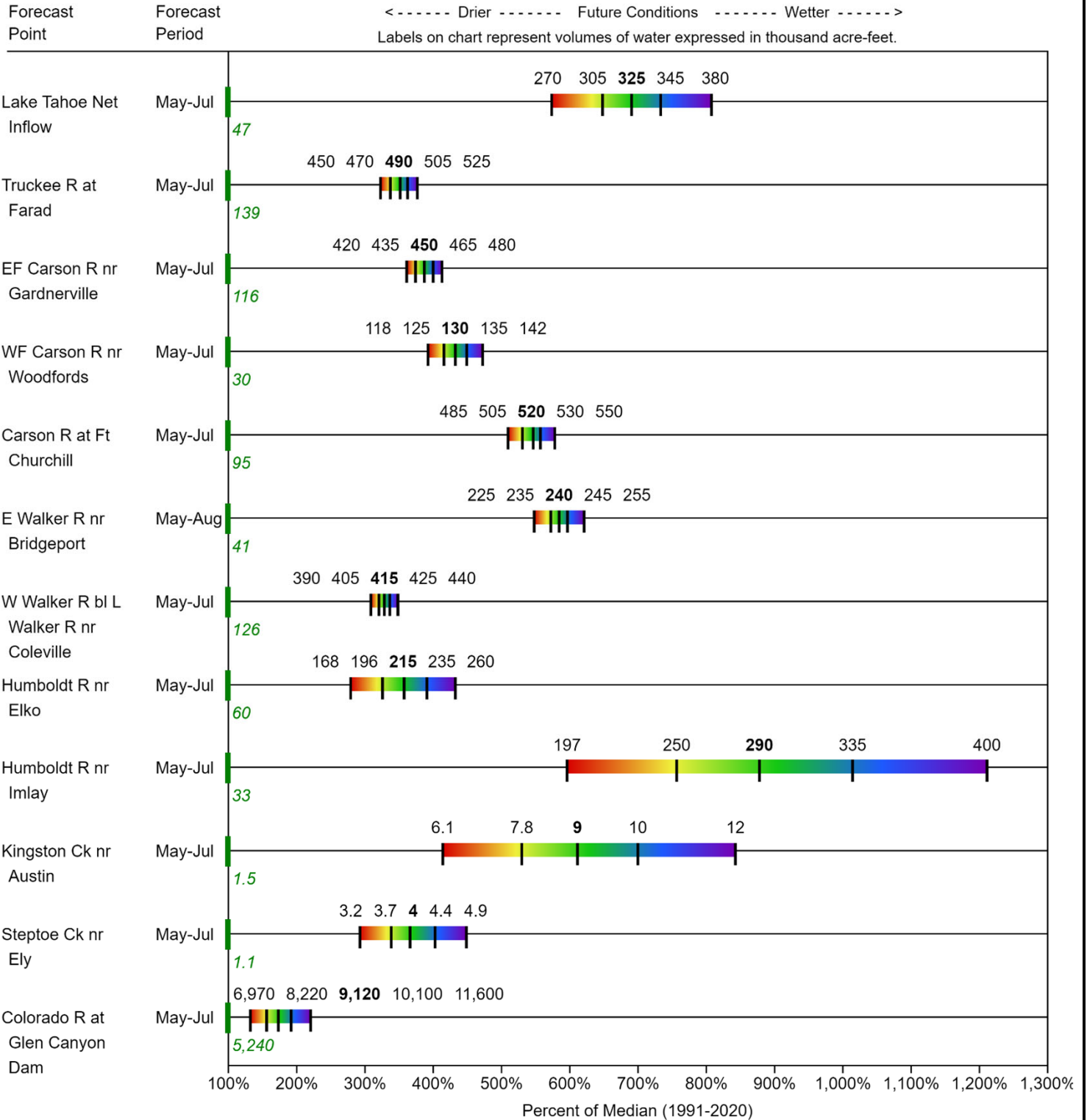
May 1, 2023
Primary Period
(May-July in most cases)



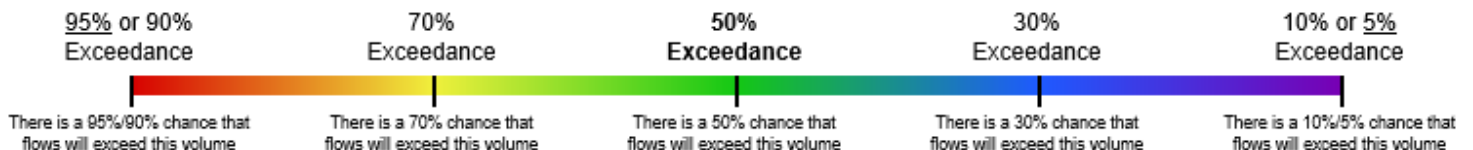
Streamflow Forecasts - State of Nevada Overview

May 1, 2023

Forecast Exceedance Probabilities



Legend

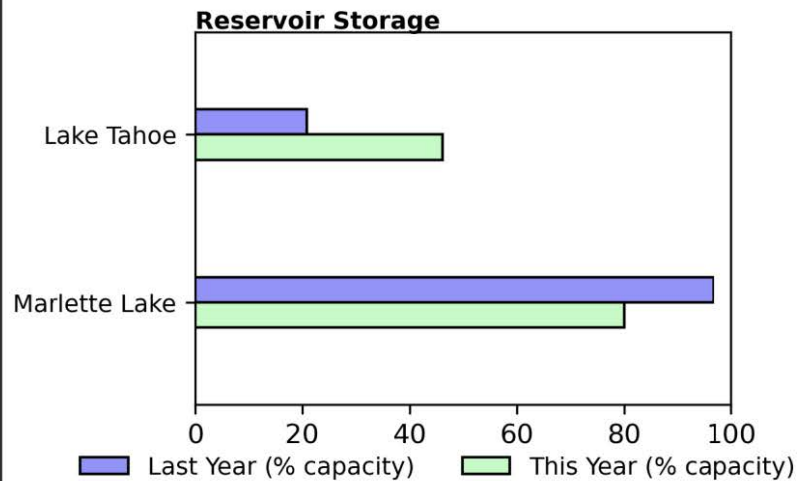
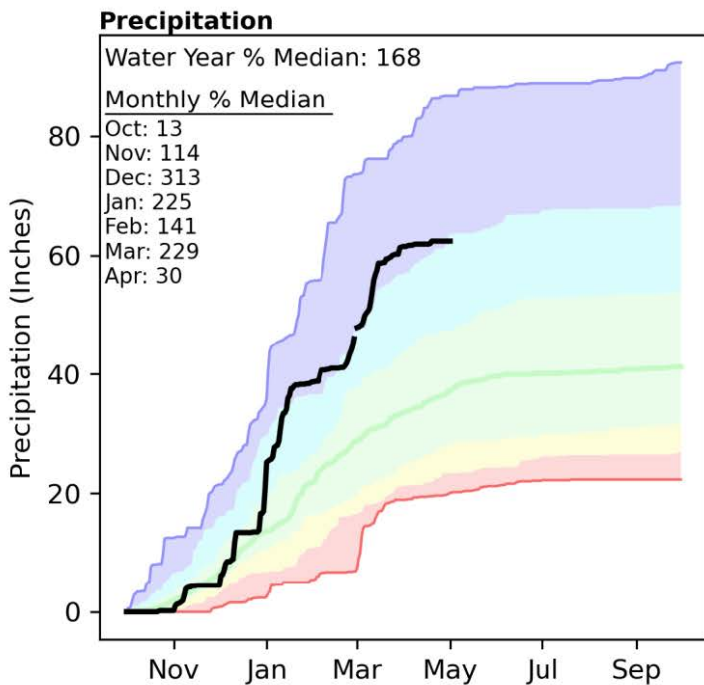
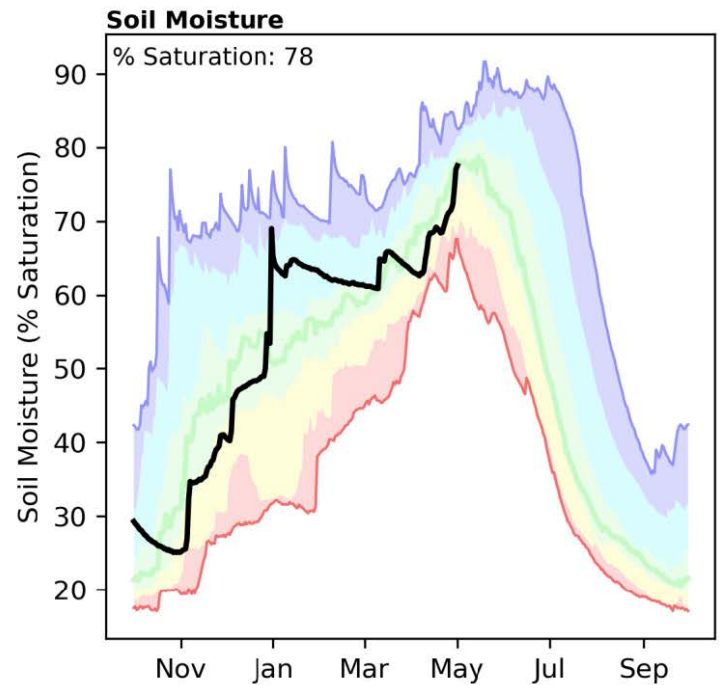
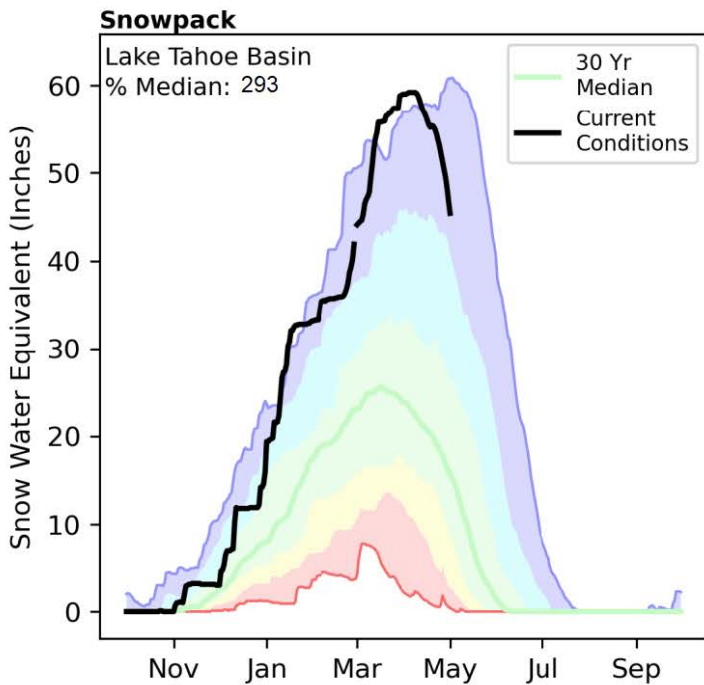


1981-2010 Normal Streamflow KAF

See appendix for more information

Lake Tahoe Basin | May 1, 2023

Snowpack in the Lake Tahoe Basin is well above normal at 293% of median, compared to 53% at this time last year. Precipitation in April was well below normal at 30%, which brings the seasonal accumulation (October-April) to 168% of median. Soil moisture is at 78% saturation compared to 75% saturation last year. Reservoir storage is 47% of capacity, compared to 22% 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.

Lake Tahoe Streamflow Forecasts - May 1, 2023

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

Lake Tahoe	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Marlette Lake Inflow	APR-JUL	1.31	1.66	1.89	473%	2.1	2.5	0.4
	MAY-JUL	0.87	1.23	1.48	925%	1.72	2.1	0.16
Lake Tahoe Rise Gates Closed ²	APR-HIGH	2.9	3.3	3.4	293%	3.5	3.9	1.16
	MAY-HIGH	2.4	2.8	2.9	408%	3	3.4	0.71
Lake Tahoe Net Inflow	APR-JUL	330	360	380	376%	400	430	101
	MAY-JUL	270	305	325	691%	345	380	47

1) 90% And 10% exceedance probabilities are actually 95% And 5%

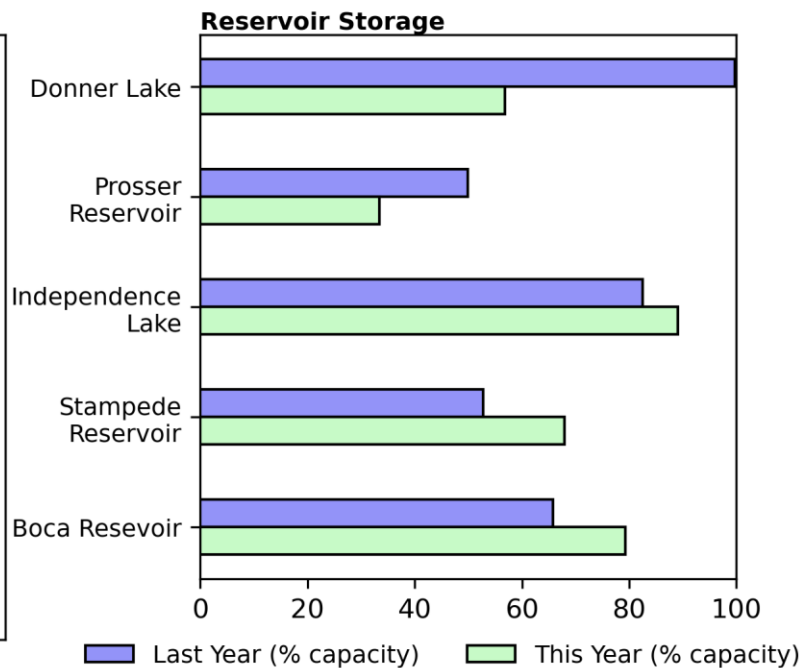
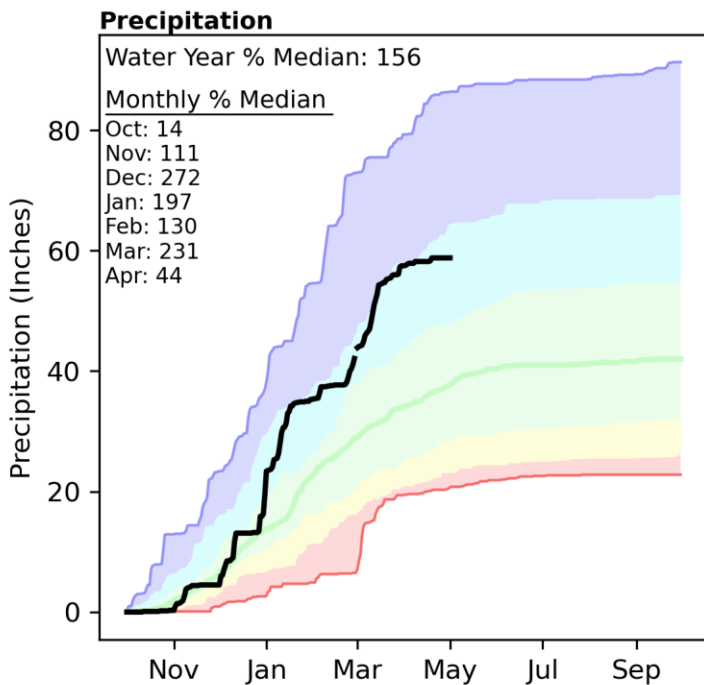
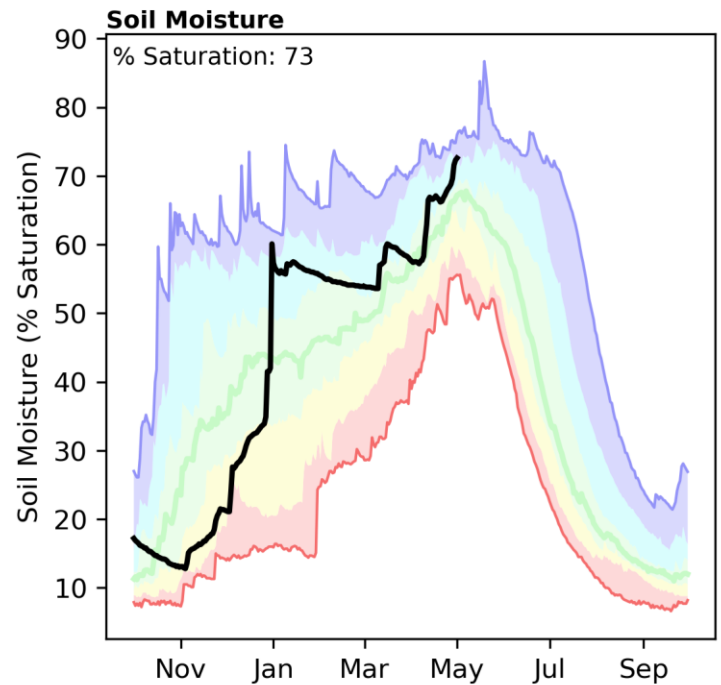
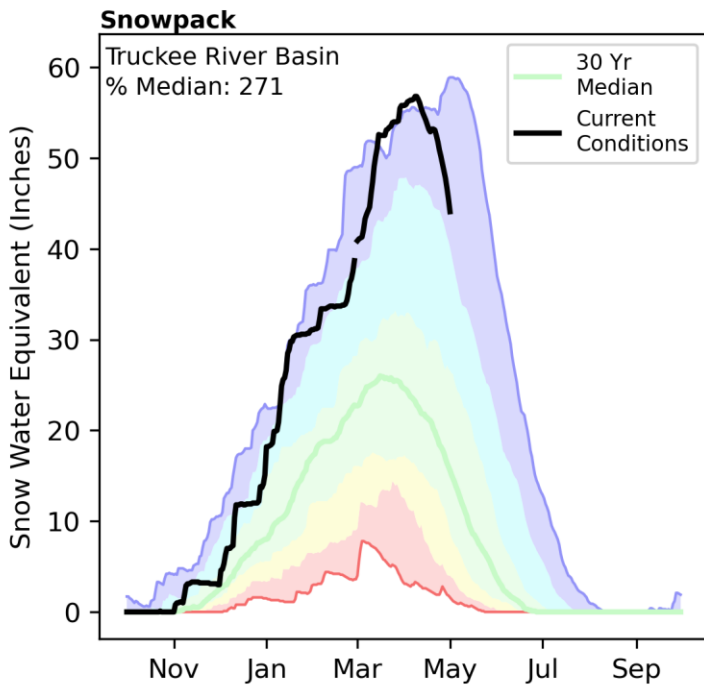
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Tahoe	342.8	155.5	311.8	744.5
Marlette Lk nr Carson City	9.4	11.4	11.9	11.8

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Lake Tahoe	12	293%	53%

Truckee River Basin | May 1, 2023

Snowpack in the Truckee River Basin is well above normal at 271% of median, compared to 72% at this time last year. Precipitation in April was well below normal at 44%, which brings the seasonal accumulation (October-April) to 156% of median. Soil moisture is at 73% saturation compared to 69% saturation last year. Reservoir storage is 67% of capacity, compared to 57% last year.



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

Truckee Streamflow Forecasts - May 1, 2023

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

Truckee	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Donner Lake Inflow ²	APR-JUL	28	30	32	213%	34	36	15
	MAY-JUL	20	23	25	305%	27	30	8.2
Martis Ck Res Inflow ²	APR-JUL	26	28	29	509%	30	32	5.7
	MAY-JUL	15.5	17	18	692%	19	21	2.6
Prosser Ck Res Inflow ²	APR-JUL	77	82	85	243%	88	93	35
	MAY-JUL	59	63	66	300%	69	73	22
Independence Lk Inflow ²	APR-JUL	19.1	20	21	200%	22	23	10.5
	MAY-JUL	17	18.2	19	238%	19.8	21	8
Sagehen Ck nr Truckee	APR-JUL	11.7	12.5	13	317%	13.5	14.3	4.1
	MAY-JUL	9.7	10.6	11.2	509%	11.8	12.7	2.2
Stampede Res Local Inflow ²	APR-JUL	150	158	164	278%	170	178	59
	MAY-JUL	106	117	125	347%	133	144	36
L Truckee R ab Boca Reservoir ²	APR-JUL	205	215	220	306%	225	235	72
	MAY-JUL	149	158	164	373%	169	178	44
Boca Res Local Inflow ²	APR-JUL	16.5	18.8	20	1316%	22	24	1.52
	MAY-JUL	3.8	4.8	5.6	1333%	6.3	7.3	0.42
Truckee R at Farad ²	APR-JUL	590	615	630	280%	645	670	225
	MAY-JUL	450	470	490	353%	505	525	139
Truckee R ab Farad Sidewater ²	APR-JUL	225	240	250	278%	260	270	90
	MAY-JUL	181	193	200	317%	205	220	63
Galena Ck at Galena Ck State Pk	APR-JUL	6.6	7.4	8	200%	8.6	9.4	4
	MAY-JUL	6.5	7.2	7.7	241%	8.2	8.9	3.2
Steamboat Ck at Steamboat	APR-JUL	8.7	12.6	15.7	748%	19.1	25	2.1
	MAY-JUL	9.3	12.1	14.2	877%	16.5	20	1.62
Pyramid Lake Elevation Change	LOW-HIGH	8.6	9.4	10		10.6	11.4	

1) 90% And 10% exceedance probabilities are actually 95% And 5%

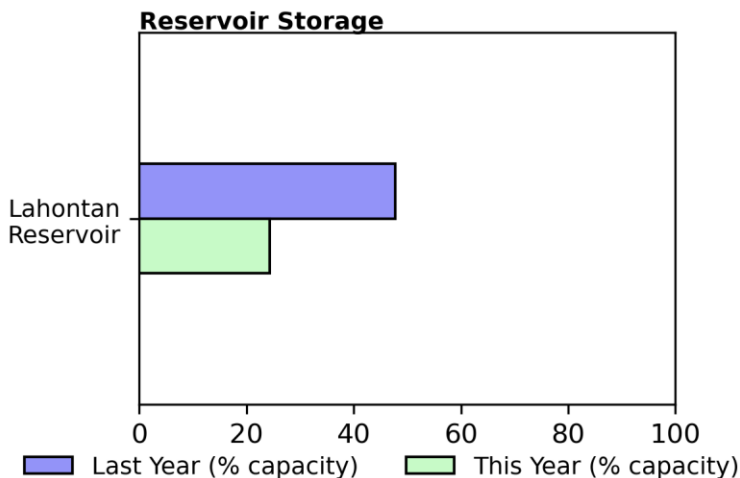
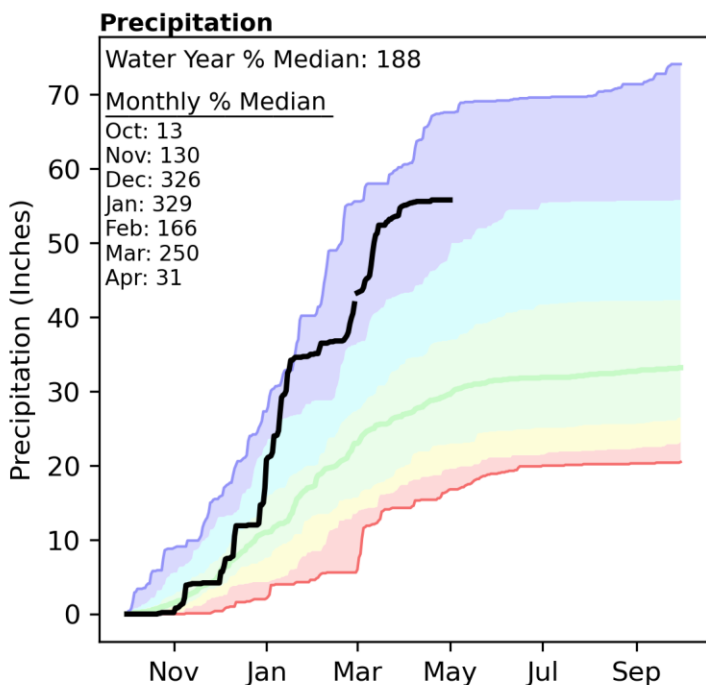
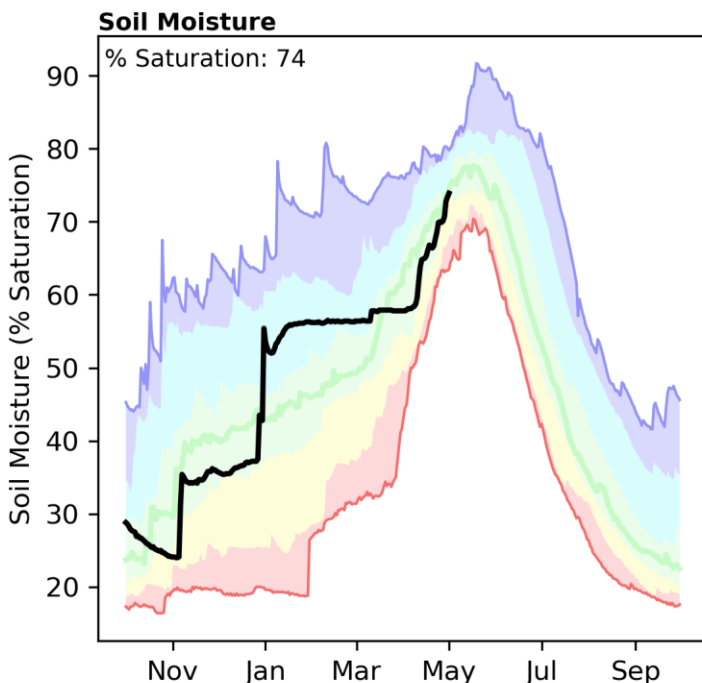
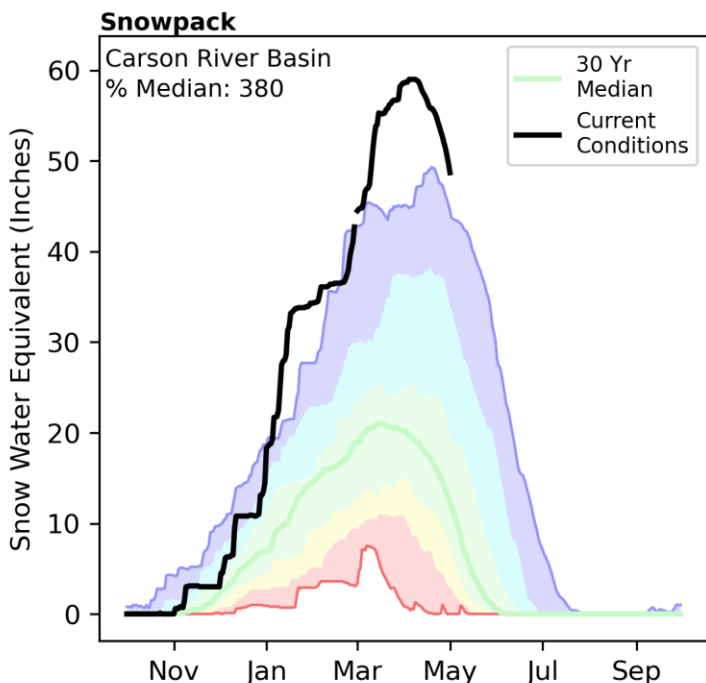
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Boca Reservoir	32.4	26.9	25.7	40.9
Donner Lake	5.4	9.5	6.3	9.5
Independence Lake	15.4	14.3	15.5	17.3
Prosser Reservoir	10.0	14.9	13.7	29.8
Stampede Reservoir	153.9	119.4	154.8	226.5

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Truckee	15	271%	72%
Little Truckee ab Stampede	5	264%	85%
Sagehen-Independence	3	285%	90%
Galena	1	209%	74%
Steamboat	1	209%	74%
Truckee above Pyramid Lake	22	292%	65%

Carson River Basin | May 1, 2023

Snowpack in the Carson River Basin is well above normal at 380% of median, compared to 44% at this time last year. Precipitation in April was well below normal at 31%, which brings the seasonal accumulation (October-April) to 188% of median. Soil moisture is at 74% saturation, same as last year at this time. Reservoir storage is 24% of capacity, compared to 48% 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 Streamflow Forecasts - May 1, 2023

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

Carson	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
EF Carson R nr Gardnerville	APR-JUL	525	540	555	338%	565	580	164
	MAY-JUL	420	435	450	388%	465	480	116
	200 cfs	19 Sep	26 Sep	01 Oct		06 Oct	13 Oct	14 Jul
	500 cfs	13 Aug	25 Aug	02 Sep		10 Sep	22 Sep	20 Jun
WF Carson R nr Woodfords	APR-JUL	138	144	148	329%	152	158	45
	MAY-JUL	118	125	130	433%	135	142	30
Carson R nr Carson City	APR-JUL	600	620	635	477%	650	670	133
	MAY-JUL	480	505	520	536%	535	560	97
Kings Canyon Ck nr Carson City	APR-JUL	0.98	1.17	1.3	1000%	1.44	1.67	0.13
	MAY-JUL	0.83	0.99	1.1	1100%	1.22	1.41	0.1
Ash Canyon Ck nr Carson City	APR-JUL	2.5	2.8	3	366%	3.2	3.5	0.82
	MAY-JUL	2.2	2.4	2.6	426%	2.8	3.1	0.61
Carson R at Ft Churchill	APR-JUL	600	620	635	485%	650	670	131
	MAY-JUL	485	505	520	547%	530	550	95

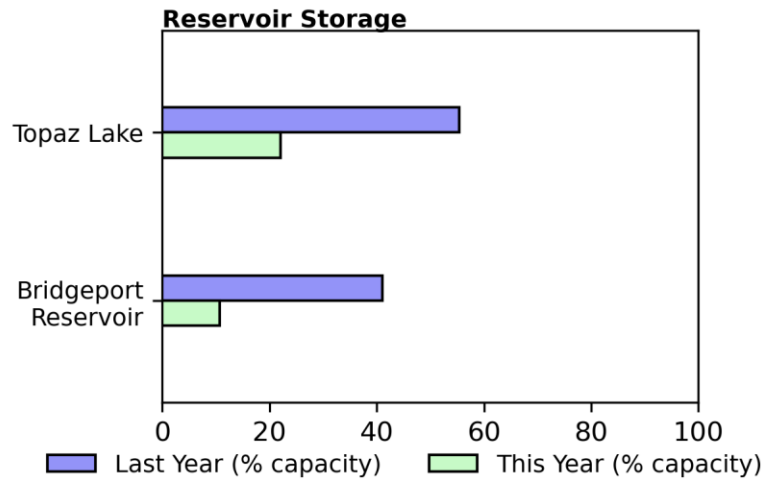
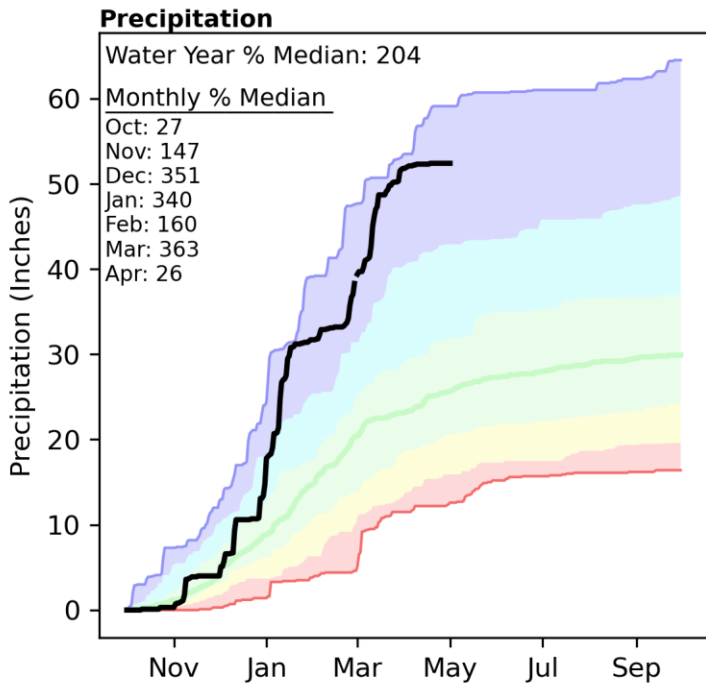
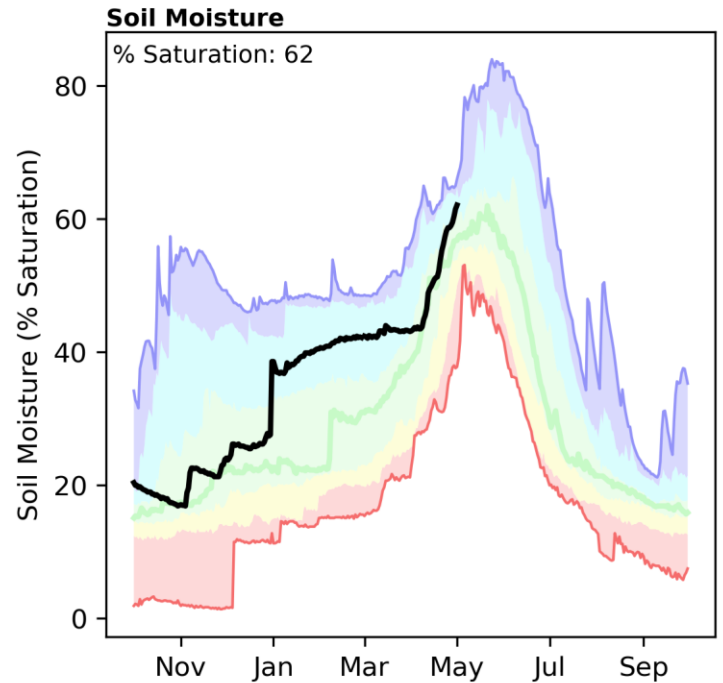
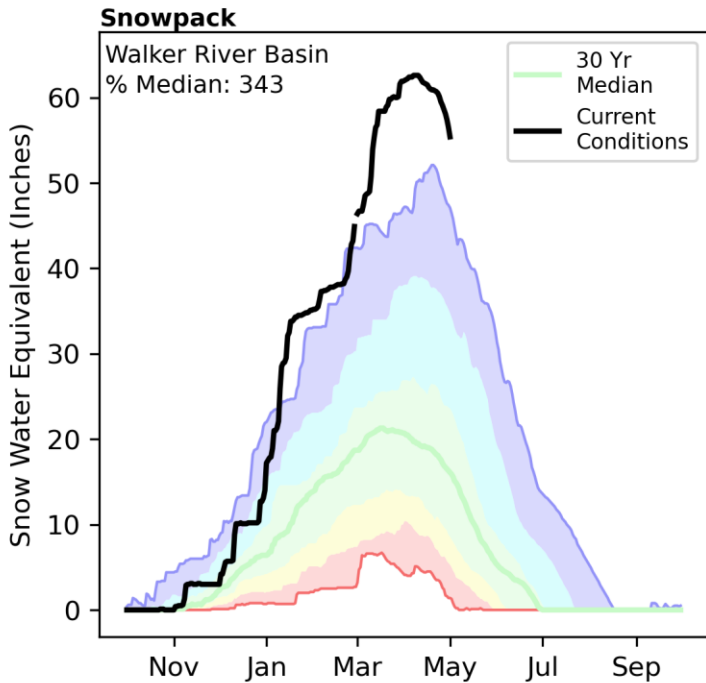
- 1) 90% And 10% exceedance probabilities are actually 95% And 5%
- 2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lahontan Reservoir	76.3	149.4	201.0	313.0

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Carson	14	380%	44%
East Fork Carson	7	372%	48%
West Fork Carson	9	358%	42%

Walker River Basin | May 1, 2023

Snowpack in the Walker River Basin is well above normal at 343% of median, compared to 55% at this time last year. Precipitation in April was well below normal at 26%, which brings the seasonal accumulation (October-April) to 204% of median. Soil moisture is at 62% saturation compared to 65% saturation last year. Reservoir storage is 17% of capacity, compared to 49% last year.



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

Walker Streamflow Forecasts - May 1, 2023

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

Walker	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
E Walker R nr Bridgeport ²	APR-AUG	265	275	280	636%	290	300	44
	MAY-AUG	225	235	240	585%	245	255	41
W Walker R bl L Walker R nr Coleville	APR-JUL	425	435	445	291%	455	470	153
	MAY-JUL	390	405	415	329%	425	440	126
W Walker R nr Coleville	APR-JUL	400	415	425	289%	435	450	147
	MAY-JUL	370	385	395	324%	405	420	122
Walker Lake Elevation Change ¹	LOW-HIGH	12.1	13.2	14		14.8	15.9	

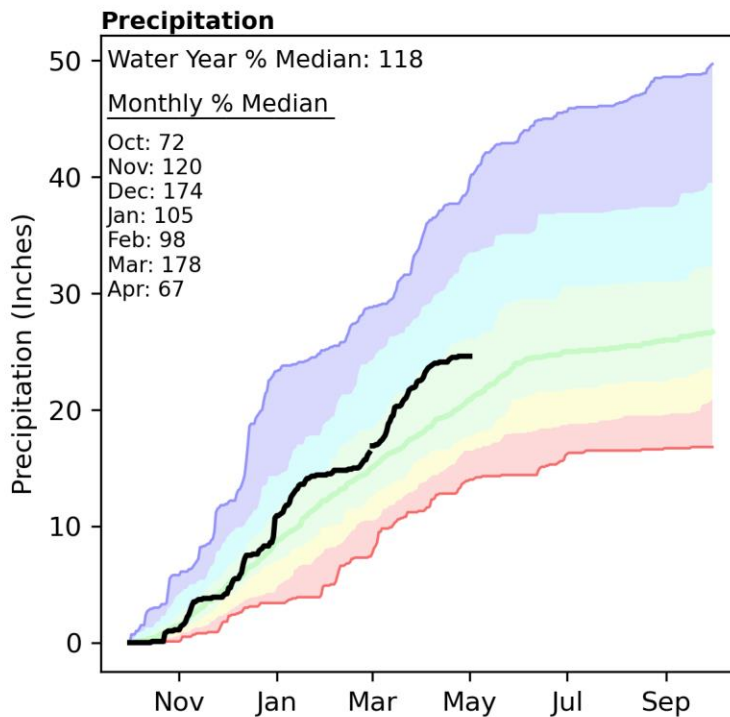
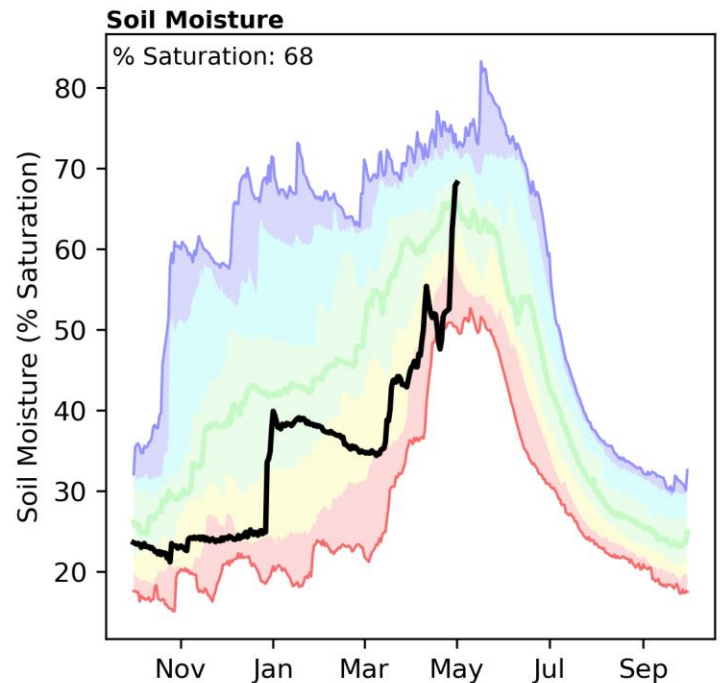
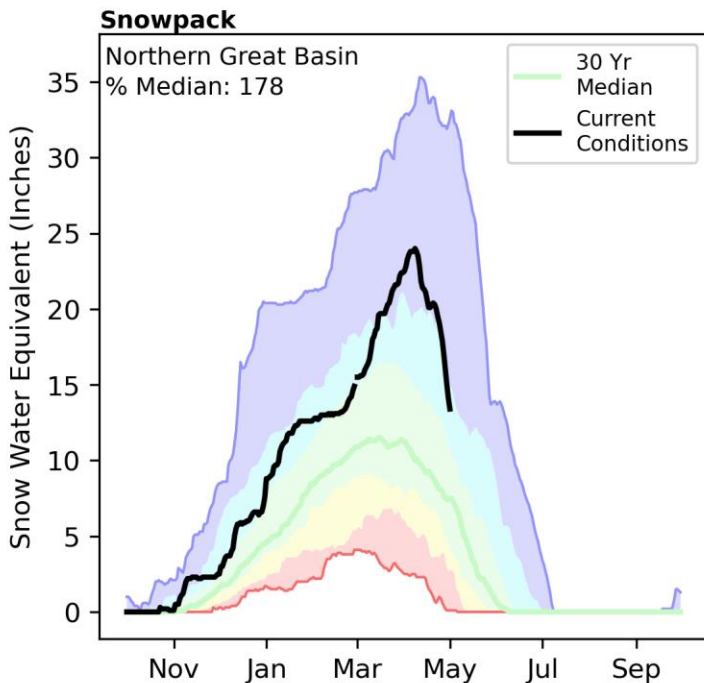
1) 90% And 10% exceedance probabilities are actually 95% And 5%

2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Bridgeport Reservoir	4.5	17.4	23.3	42.5
Topaz Lk nr Topaz	13.1	32.9	24.3	59.4

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Walker	8	344%	55%
East Walker ab Bridgeport	2	426%	42%
West Walker ab Coleville	7	344%	54%

Snowpack in the Northern Great Basin is well above normal at 178% of median, compared to 78% at this time last year. Precipitation in April was well below normal at 67%, which brings the seasonal accumulation (October-April) to 118% of median. Soil moisture is at 68% saturation compared to 67% saturation last year.



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

Northern Great Basin Streamflow Forecasts - May 1, 2023

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

Northern Great Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
McDermitt Ck nr McDermitt	APR-JUL	16.5	21	24	329%	27	32	7.3
	MAY-JUL	4.6	6.7	8.3	180%	10.1	13.1	4.6

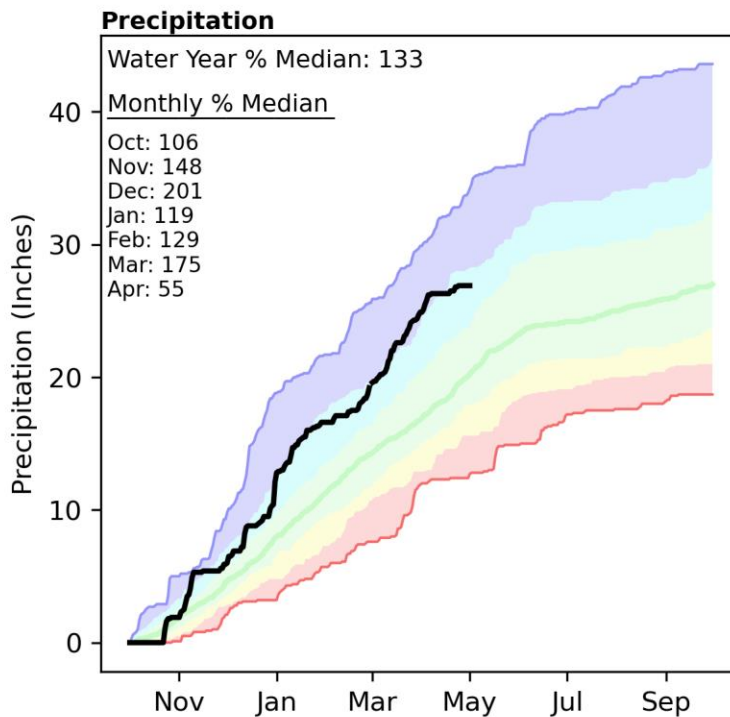
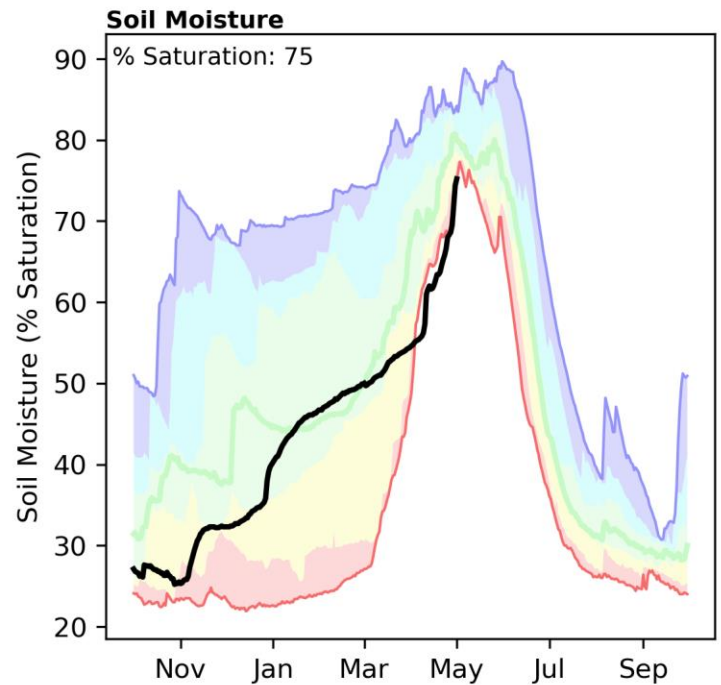
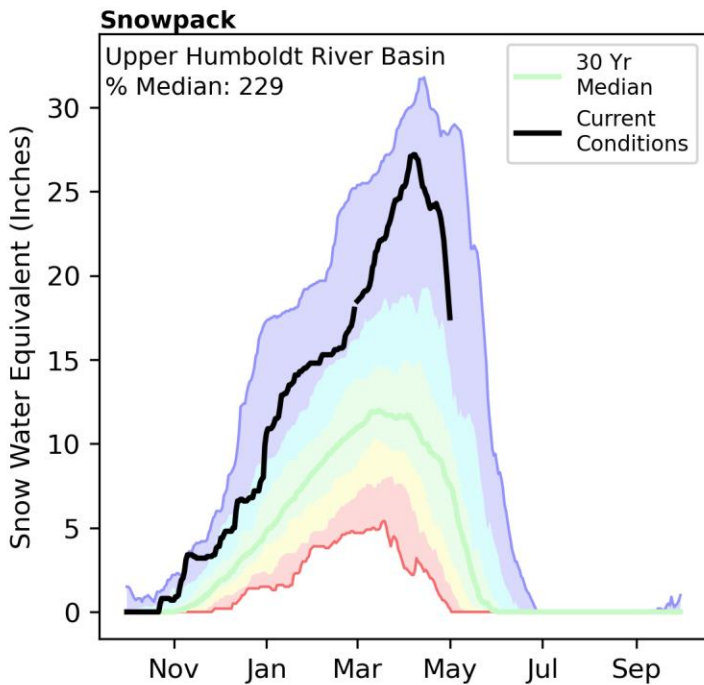
1) 90% And 10% exceedance probabilities are actually 95% And 5%

2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Northern Great Basin	7	178%	78%
Surprise Valley-Warner Mtns	2	151%	73%
McDermitt	1		
Quinn	4	240%	87%

Upper Humboldt River Basin | May 1, 2023

Snowpack in the Upper Humboldt River Basin is well above normal at 229% of median, compared to 37% at this time last year. Precipitation in April was well below normal at 55%, which brings the seasonal accumulation (October-April) to 133% of median. Soil moisture is at 75% saturation compared to 77% saturation last year.



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

Upper Humboldt Streamflow Forecasts - May 1, 2023

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

Upper Humboldt	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Marys R nr Deeth	APR-JUL	46	52	57	219%	62	68	26
	MAY-JUL	37	43	48	255%	53	59	18.8
Lamoille Ck nr Lamoille	APR-JUL	41	46	50	192%	54	59	26
	MAY-JUL	39	44	48	192%	52	57	25
NF Humboldt R at Devils Gate	APR-JUL	53	62	68	378%	74	83	18
	MAY-JUL	33	40	45	349%	50	57	12.9
Humboldt R nr Elko	APR-JUL	199	230	255	370%	275	305	69
	MAY-JUL	168	196	215	358%	235	260	60
SF Humboldt R abv Tenmile Ck	APR-JUL	133	147	157	302%	167	181	52
	MAY-JUL	113	127	136	296%	145	159	46
SF Humboldt R ab Dixie Ck	APR-JUL	129	144	155	304%	166	181	51
	MAY-JUL	106	122	133	289%	144	161	46
Humboldt R nr Carlin	APR-JUL	325	390	435	435%	485	560	100
	MAY-JUL	270	320	360	424%	400	460	85
Humboldt R at Palisade	APR-JUL	370	440	490	450%	545	630	109
	MAY-JUL	300	355	395	449%	435	500	88

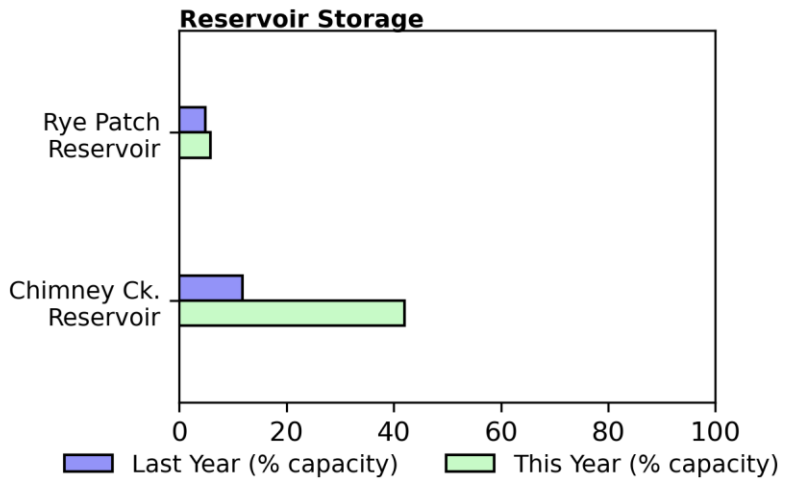
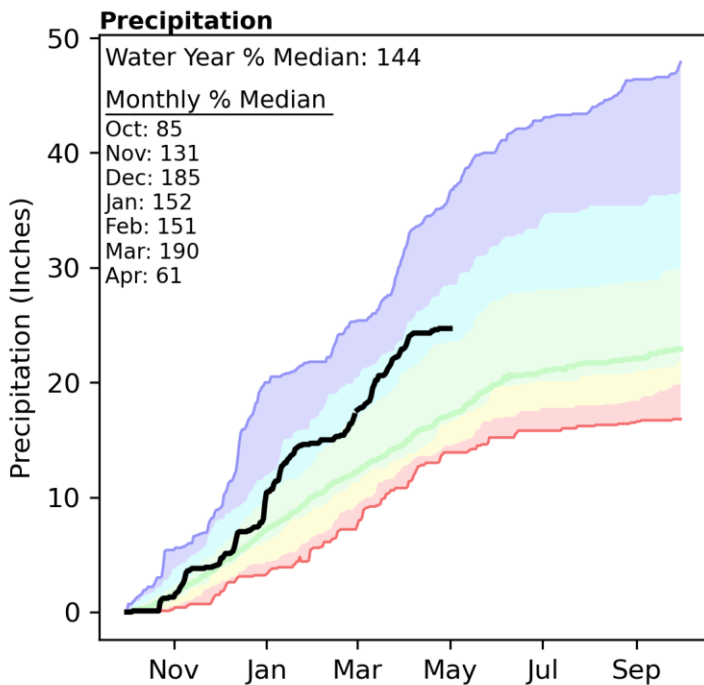
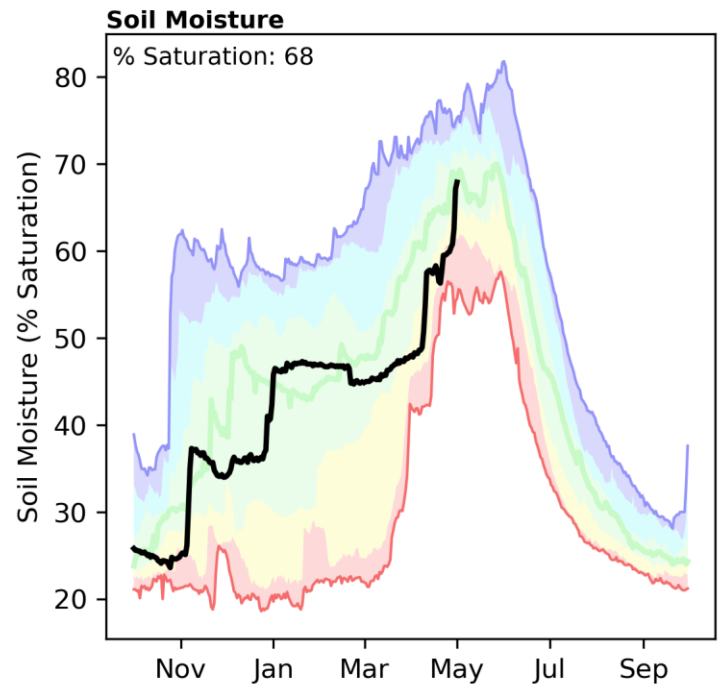
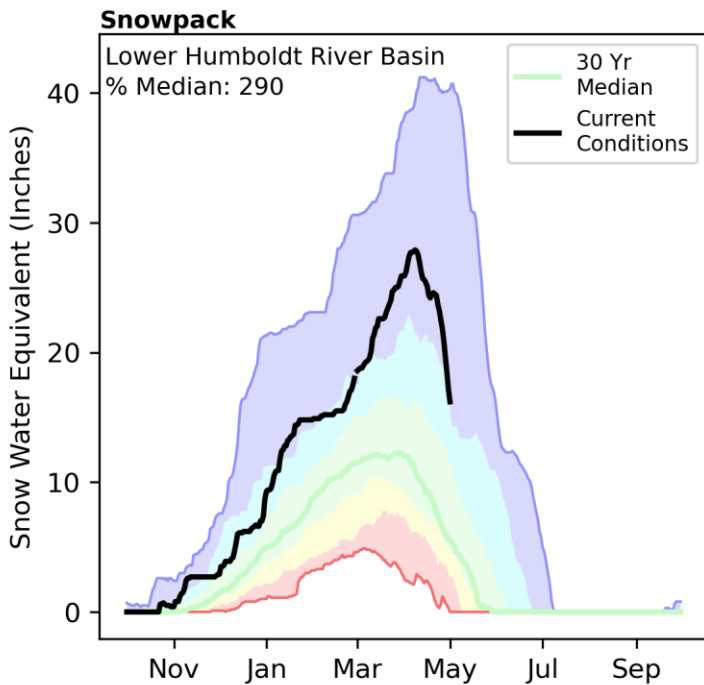
1) 90% And 10% exceedance probabilities are actually 95% And 5%

2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Upper Humboldt	9	229%	37%
Mary's	3	251%	56%
Lamoille	1	311%	2%
North Fork Humboldt	2	148%	53%
South Fork Humboldt	3	267%	27%

Lower Humboldt River Basin | May 1, 2023

Snowpack in the Lower Humboldt River Basin is well above normal at 290% of median, compared to 79% at this time last year. Precipitation in April was well below normal at 61%, which brings the seasonal accumulation (October-April) to 144% of median. Soil moisture is at 68% saturation compared to 74% saturation last year. Reservoir storage is 11% of capacity, compared to 6% last year.



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

Lower Humboldt Streamflow Forecasts - May 1, 2023

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

Lower Humboldt	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Rock Ck nr Battle Mountain	APR-JUL	24	34	42	689%	50	64	6.1
	MAY-JUL	5.9	10.8	15	536%	19.9	28	2.8
Humboldt R at Comus	APR-JUL	265	325	370	468%	420	500	79
	MAY-JUL	225	275	315	516%	355	420	61
L Humboldt R nr Paradise Valley ²	APR-JUL	16.3	19.1	21	362%	23	26	5.8
	MAY-JUL	3.7	6.6	8.6	307%	10.5	13.4	2.8
Martin Ck nr Paradise Valley	APR-JUL	26	30	32	296%	35	39	10.8
	MAY-JUL	10.6	14.6	17.4	256%	20	24	6.8
Humboldt R nr Imlay	APR-JUL	205	270	320	615%	370	455	52
	MAY-JUL	197	250	290	879%	335	400	33

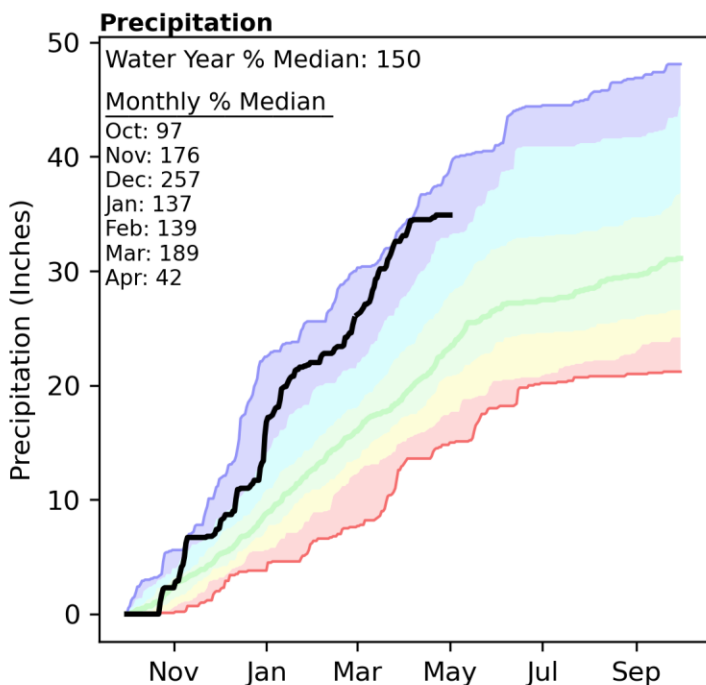
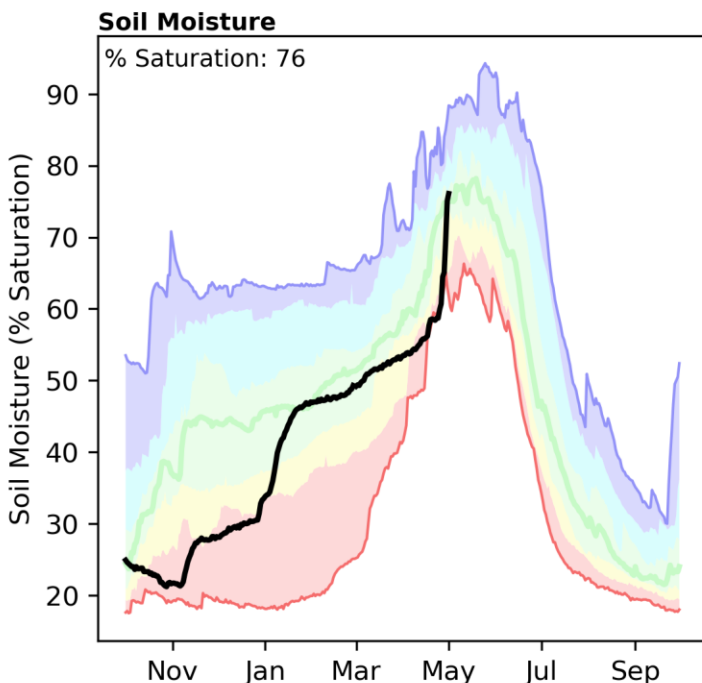
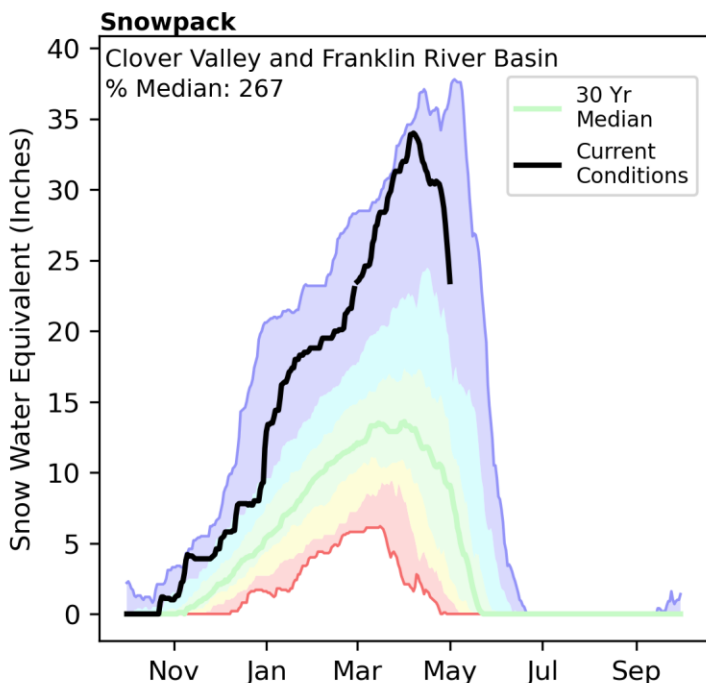
1) 90% And 10% exceedance probabilities are actually 95% And 5%

2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Chimney Creek Reservoir	14.7	4.1	7.1	35.0
Rye Patch Re nr Rye Patch, NV	11.3	9.4	56.8	194.3

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Lower Humboldt	6	290%	79%
Rock	1	2200%	657%
Reese	2	259%	46%
Martin	2	240%	87%
Little Humboldt	3	240%	87%
Humboldt above Imlay	15	249%	50%

Snowpack in the Clover Valley and Franklin River Basin is well above normal at 267% of median, compared to 26% at this time last year. Precipitation in April was well below normal at 42%, which brings the seasonal accumulation (October-April) to 150% of median. Soil moisture is at 76% saturation compared to 77% saturation last year.



Hole-in-Mountain SNOTEL - Status

Starting in water year 2020, automated snow water and snow depth measurements have been moved back to the original Hole-in-Mountain SNOTEL location used from 1981-2015. This move allows daily snow water percent of median to be calculated using historic data. The SNOTEL was re-located outside an avalanche zone in 2016 following an avalanche that damaged the site. Unfortunately, the new location while protected from future slides, was subject to drifting and snow data proved unrepresentative. Snow data from 2016-2020 have been removed from the public database and will appear as missing in NRCS products. Other SNOTEL parameters collected at the newer location are representative and were not moved. These include air temperature, precipitation and soil moisture.

Contact Jeff Anderson for more information:
jeff.anderson@usda.gov or 775-834-0913

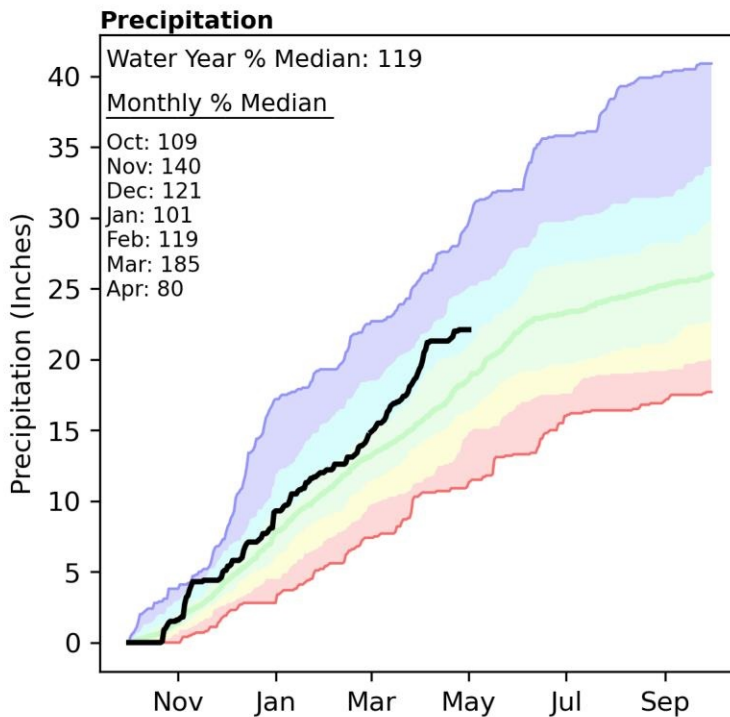
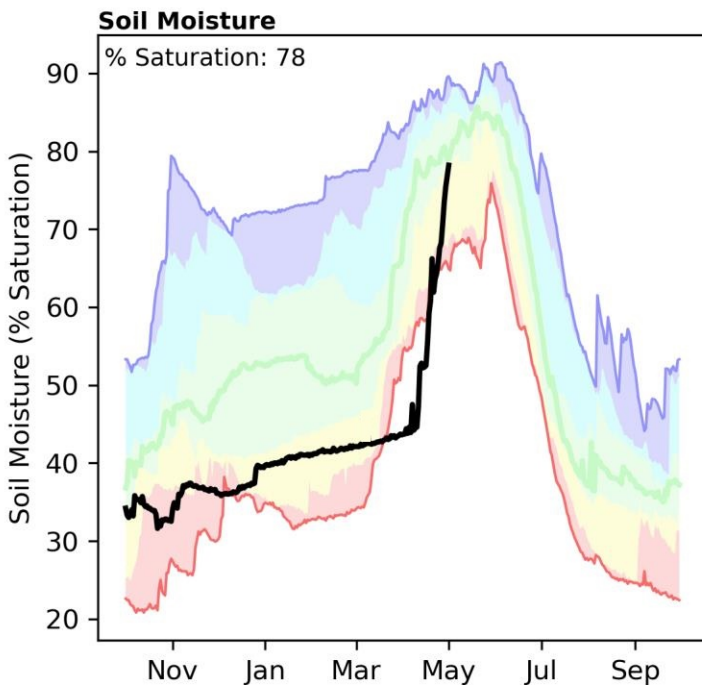
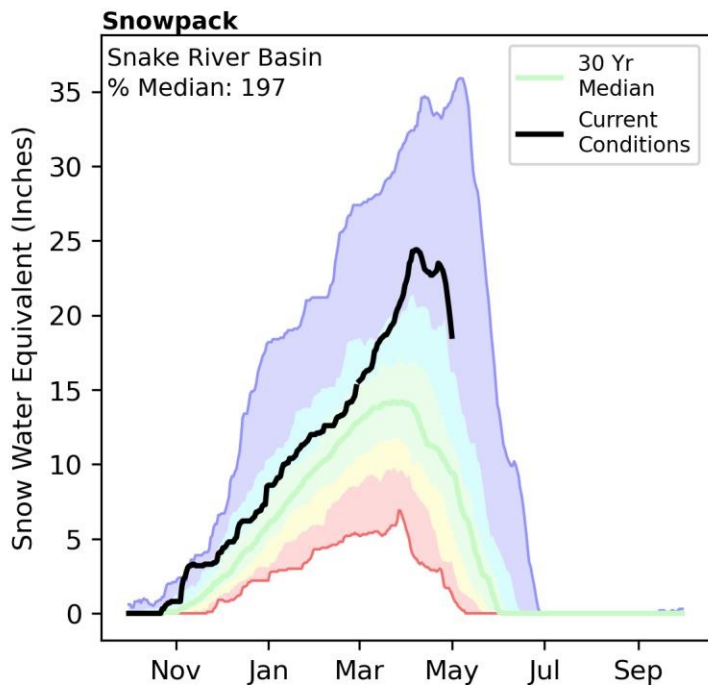
Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
For more information visit: [30 year normal calculation description](#)

Clover Valley And Franklin - May 1, 2023

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Clover Valley and Franklin	5	267%	26%
Clover Valley	2	267%	24%
Franklin	4	249%	20%

Snake River Basin | May 1, 2023

Snowpack in the Snake River Basin is well above normal at 197% of median, compared to 80% at this time last year. Precipitation in April was below normal at 80%, which brings the seasonal accumulation (October-April) to 119% of median. Soil moisture is at 78% saturation, same as last year at this time.



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

Snake Streamflow Forecasts - May 1, 2023

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

Snake	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Bruneau R at Rowland	MAY-JUL	33	43	50	161%	57	67	31
	MAY-SEP	35	45	52	168%	59	69	31
Jarbidge River Below Jarbidge	MAY-JUL	19.8	23	24	141%	26	29	17
	MAY-SEP	20	23	25	142%	27	30	17.6
Salmon Falls Ck nr San Jacinto	MAY-JUL	54	69	81	203%	94	114	40
	MAY-SEP	57	73	85	198%	97	117	43

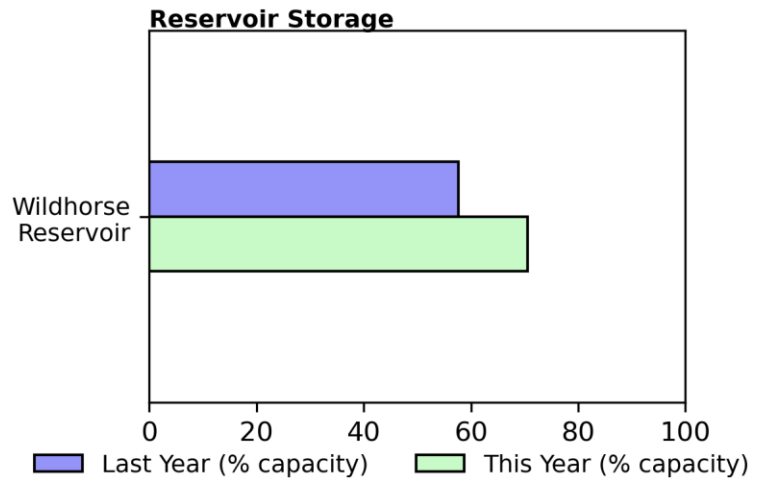
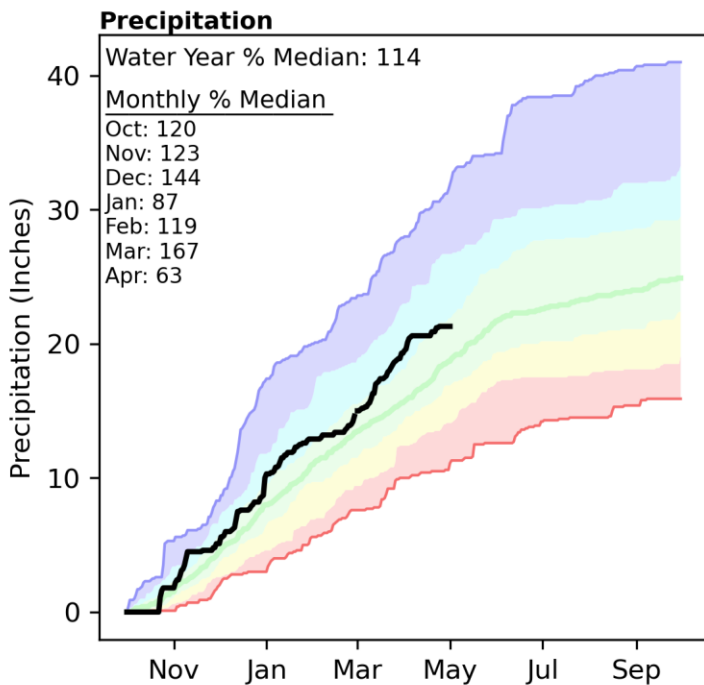
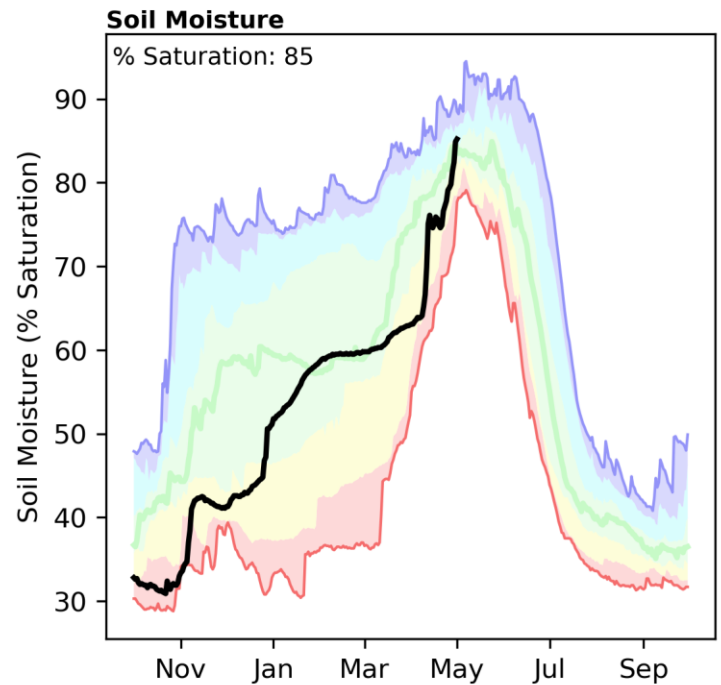
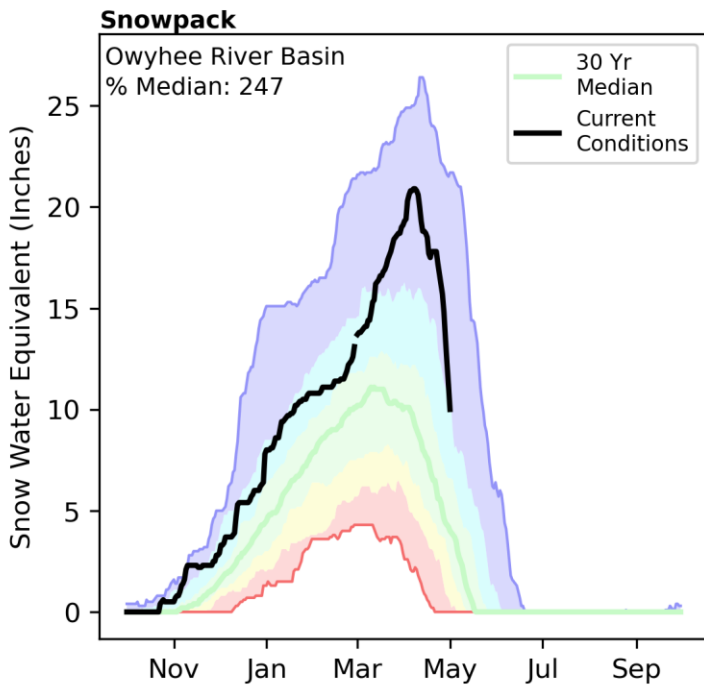
1) 90% And 10% exceedance probabilities are actually 95% And 5%

2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Watershed Snowpack Analysis May 1, 2023			
	# of Sites	% Median	Last Year % Median
Snake	7	197%	80%
Bruneau Headwaters	3	232%	59%
Jarbidge	3	159%	78%
Salmon Falls	4	184%	88%

Owyhee River Basin | May 1, 2023

Snowpack in the Owyhee River Basin is well above normal at 247% of median, compared to 71% at this time last year. Precipitation in April was well below normal at 63%, which brings the seasonal accumulation (October-April) to 114% of median. Soil moisture is at 85% saturation compared to 83% saturation last year. Reservoir storage is 71% of capacity, compared to 58% last year.



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

Owyhee Streamflow Forecasts - May 1, 2023

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

Owyhee	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Owyhee R nr Gold Ck ²	MAY-JUL	9.2	10.2	11	216%	11.8	13	5.1

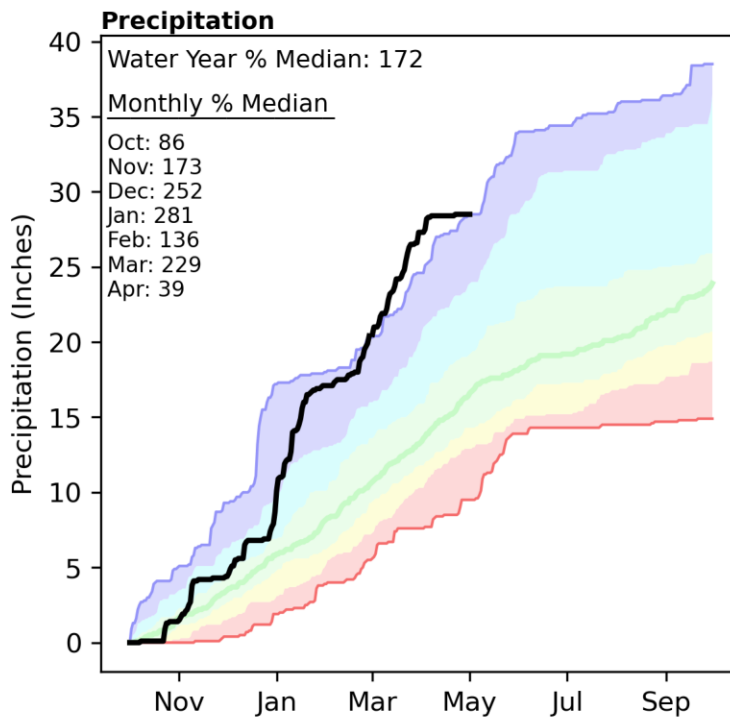
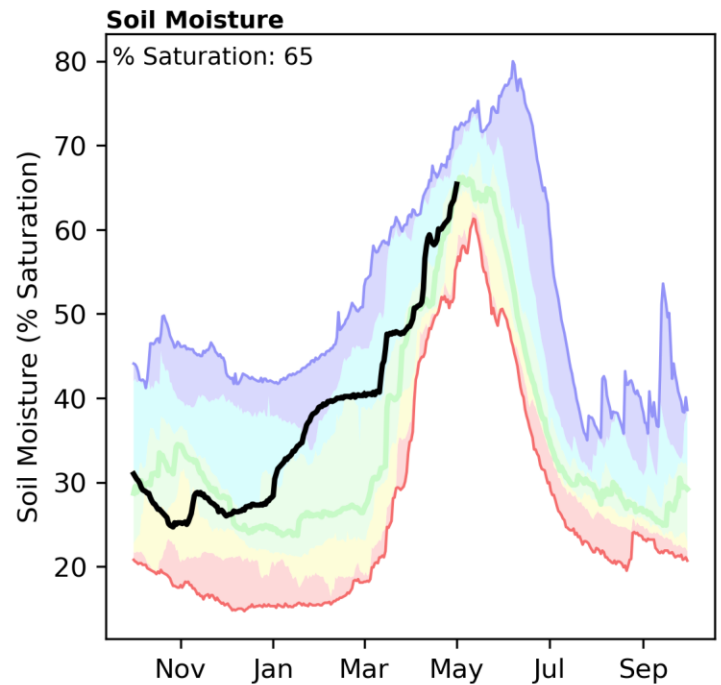
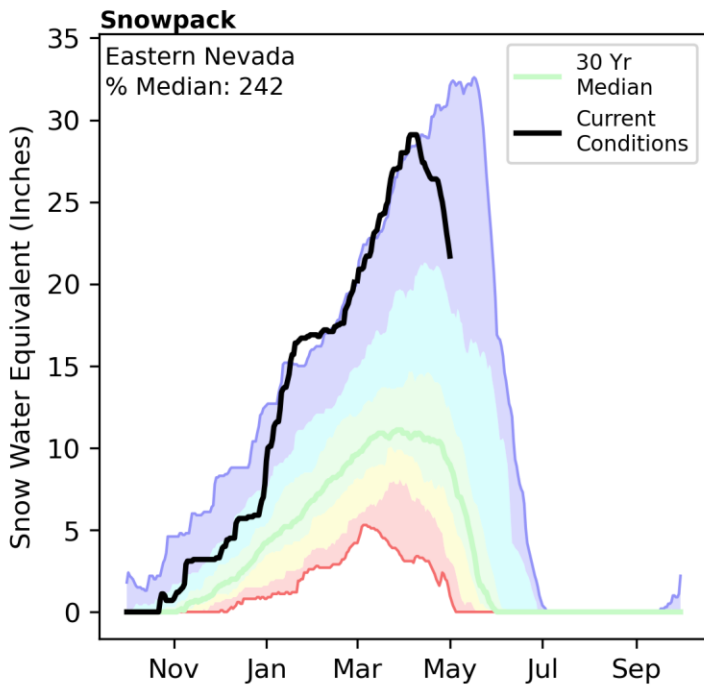
1) 90% And 10% exceedance probabilities are actually 95% And 5%

2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Wild Horse Reservoir	50.4	41.2	41.1	71.5

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Owyhee	6	247%	71%
Owyhee ab Owhyee	4	189%	53%
Owhyee ab Gold Creek	2	194%	53%
South Fork Owyhee	5	221%	71%

Snowpack in Eastern Nevada is well above normal at 242% of median, compared to 56% at this time last year. Precipitation in April was well below normal at 39%, which brings the seasonal accumulation (October-April) to 172% of median. Soil moisture is at 65% saturation compared to 66% saturation last year.



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

Eastern Nevada Streamflow Forecasts - May 1, 2023

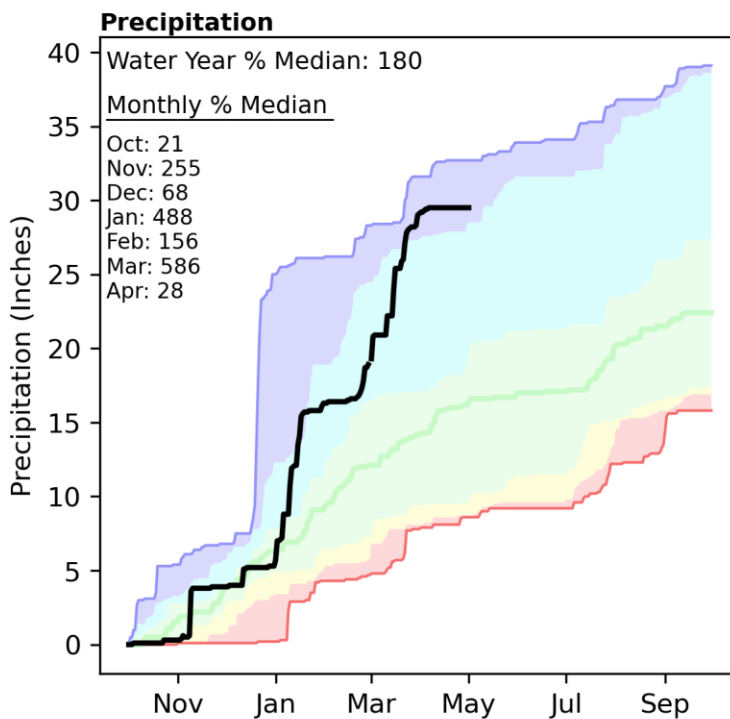
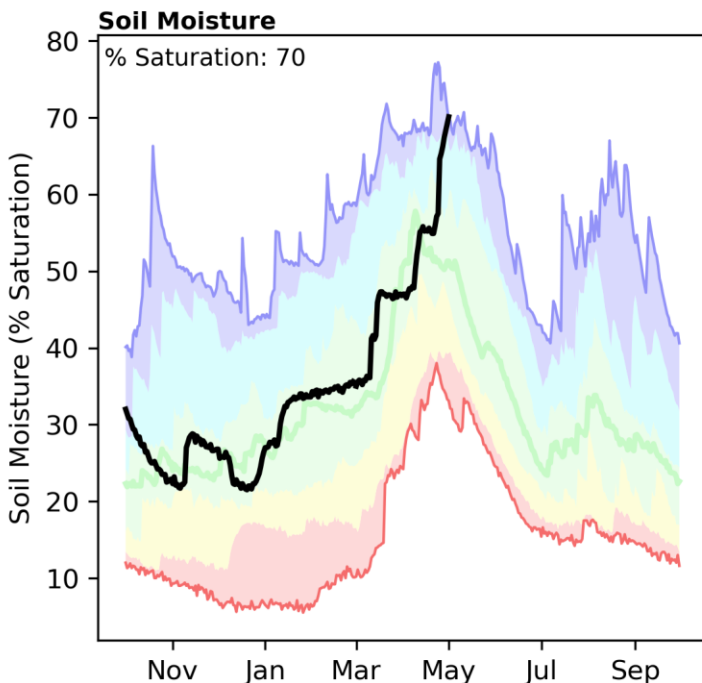
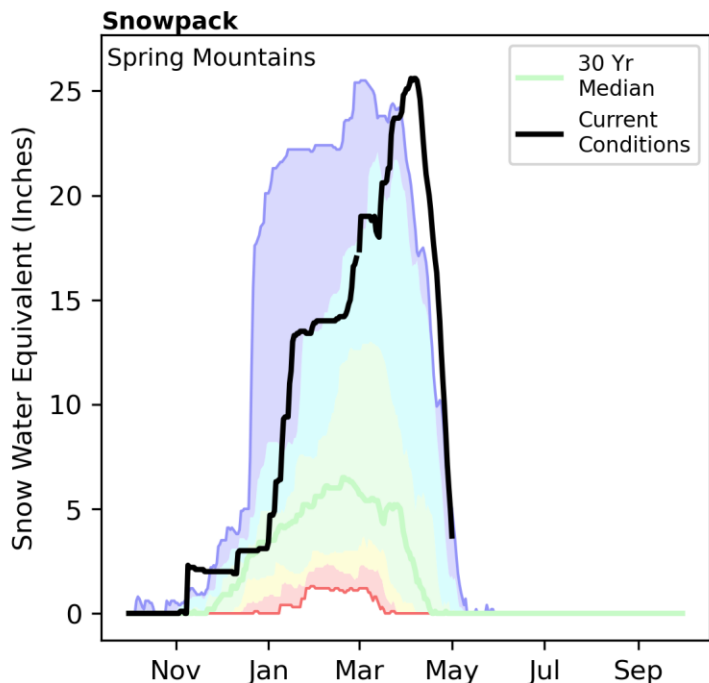
Forecast Exceedance Probabilities For Risk Assessment
Chance that actual volume will exceed forecast

Eastern Nevada	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Kingston Ck nr Austin	APR-JUL	6.7	8.3	9.5	534%	10.8	12.7	1.78
	MAY-JUL	6.1	7.8	9	612%	10.3	12.4	1.47
Step toe Ck nr Ely	APR-JUL	3.6	4.1	4.5	331%	4.9	5.5	1.36
	MAY-JUL	3.2	3.7	4	367%	4.4	4.9	1.09
Cleve Ck nr Ely	APR-JUL	6.6	7.6	8.4	311%	9.2	10.5	2.7
	MAY-JUL	5.3	6.3	7	304%	7.8	8.9	2.3
Lehman Ck nr Baker	APR-JUL	4	4.6	5.1	256%	5.6	6.2	1.99
	MAY-JUL	3.7	4.4	4.9	261%	5.3	6	1.88

- 1) 90% And 10% exceedance probabilities are actually 95% And 5%
- 2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Eastern Nevada	5	242%	56%
Kingston	1	196%	49%
Step toe Valley	2	228%	47%

SNOTEL sites in the Spring Mountains are currently reporting 3" of Snow Water Equivalent. Precipitation in April was well below normal at 28%, which brings the seasonal accumulation (October-April) to 180% of median. Soil moisture is at 70% saturation compared to 47% saturation last year.

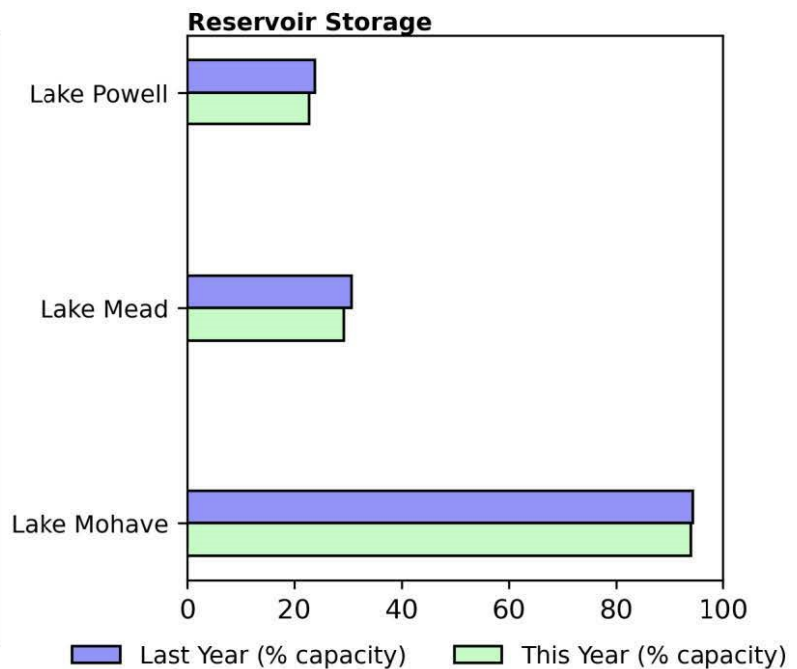
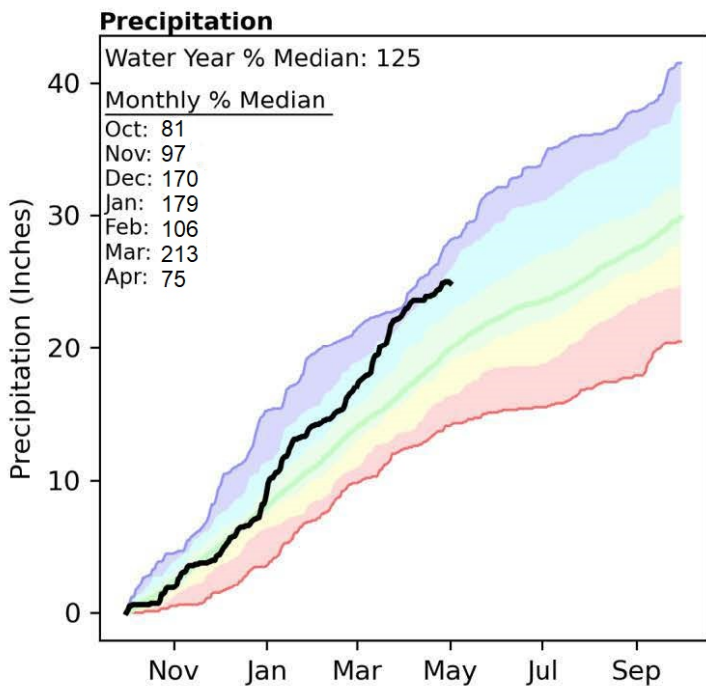
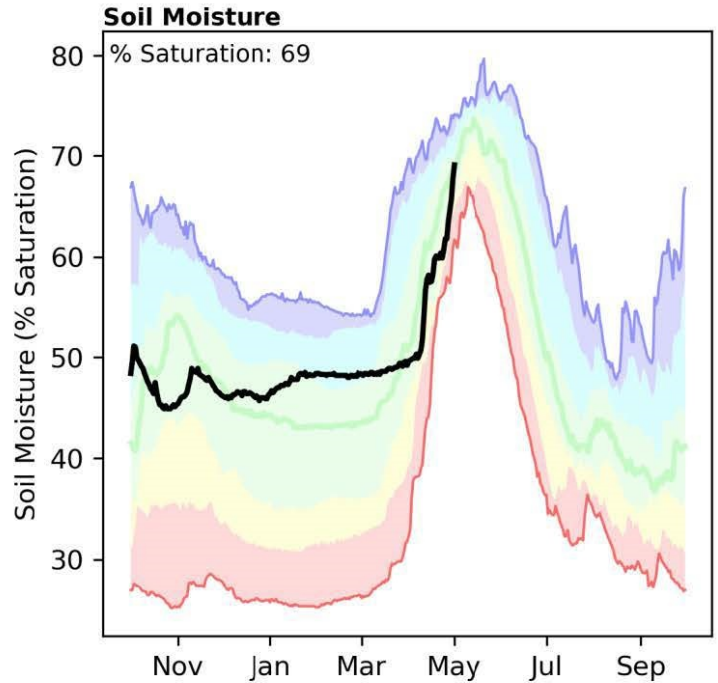
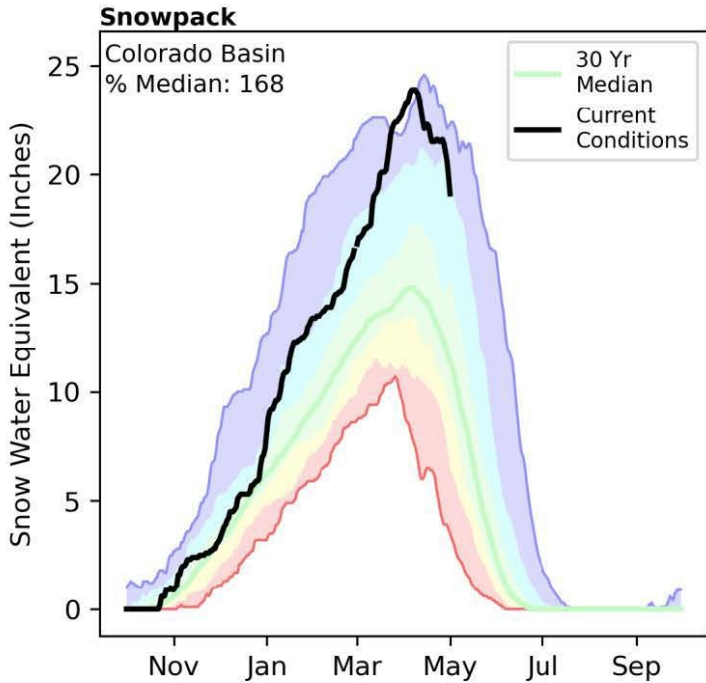


Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
For more information visit: [30 year normal calculation description](#)

SNOTEL sites in the Spring Mountains were installed in 2008. Reported percentages are based on SNOTEL medians calculated using data from water years 2009-2020, not the full 30-year period. Snowpack percentages in the March and April reports include snow course measurements from long term data collection transects.

Colorado Basin | May 1, 2023

Snowpack in the Colorado Basin above Lake Powell is well above normal at 168% of median, compared to 75% at this time last year. Precipitation in April was well below normal at 75%, which brings the seasonal accumulation (October-April) to 125% of median. Soil moisture is at 69% saturation, same as last year at this time. Reservoir storage in the Lower Colorado Basin is 28% of capacity, compared to 29% last year.



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

Colorado Streamflow Forecasts - May 1, 2023

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

Colorado	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Lake Powell Inflow ²	APR-JUL	8370	9620	10500	171%	11500	13000	6130
	MAY-JUL	6970	8220	9120	174%	10100	11600	5240
Virgin R at Littlefield	APR-JUL	159	172	180	545%	189	200	33
	MAY-JUL	86	99	107	510%	116	128	21
Virgin R nr Hurricane	APR-JUL	152	163	171	552%	179	191	31
	MAY-JUL	96	107	115	622%	123	135	18.5

1) 90% And 10% exceedance probabilities are actually 95% And 5%

2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

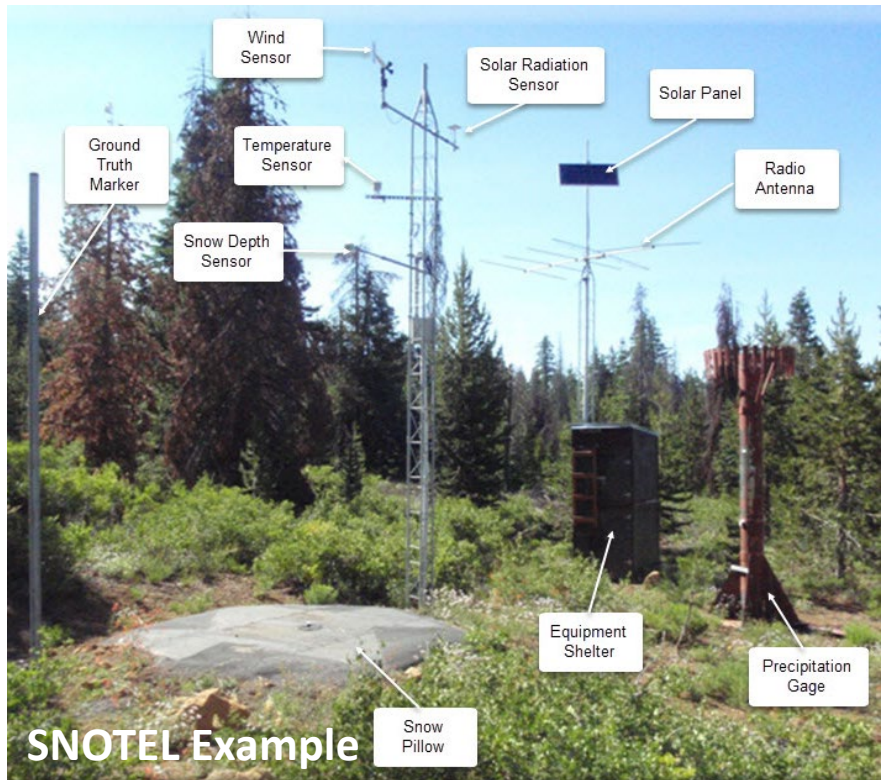
Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Powell	5544.3	5790.6	12892.0	24322.0
Lake Mead	7661.0	8026.0	14916.0	26159.0
Lake Mohave	1698.0	1706.0	1699.0	1810.0

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Virgin	9	308%	37%
Upper Colorado	131	166%	76%

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.



SNOTEL Example

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 Course Example

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



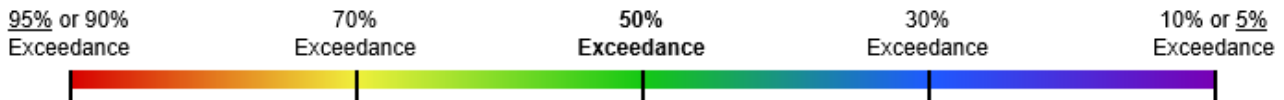
Snow core inside snow tubes

Appendix: Interpreting the Streamflow Forecast Chart

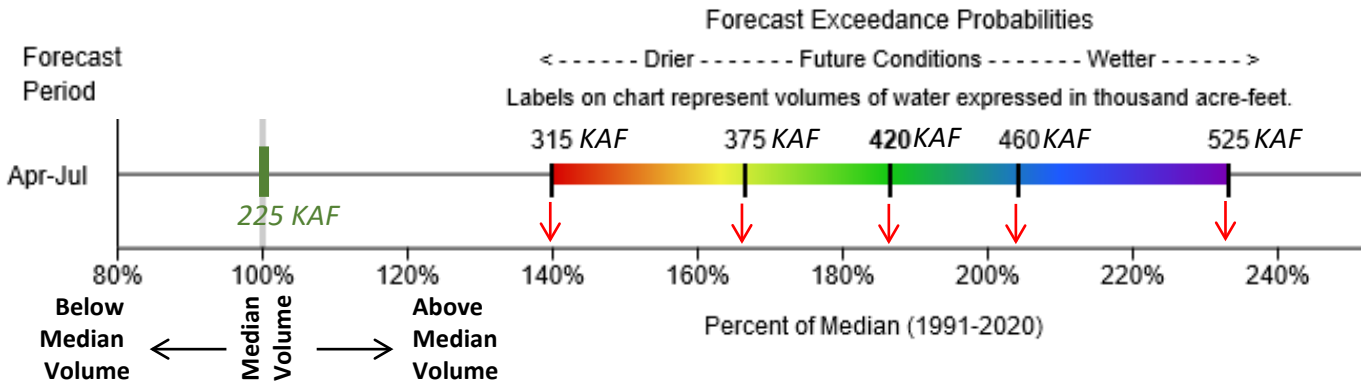
Forecast Exceedance Probabilities for Risk Assessment
Chance that actual volume will exceed forecast

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.

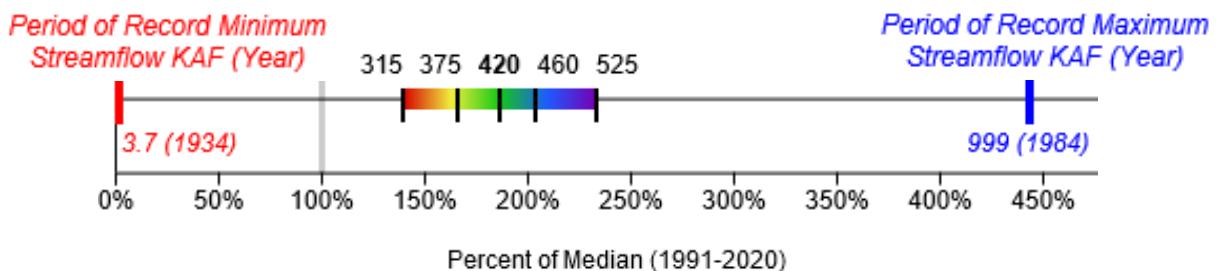


The numbers above the forecast bar are the five exceedance probability volumes in thousand acre-feet (KAF). Each exceedance forecast's percent of median can be estimated by looking at the horizontal axis. The green line and number centered above 100% on the horizontal axis represents the 1981-2010 historical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



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A number of [NRCS field offices and outside agencies](#)
provide assistance with snow course measurements.
This cooperation is greatly appreciated.

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List of Streamflow Adjustments:

Lake Tahoe Net Inflow (2) (externally adjusted by US Water Master*) = Lake Tahoe storage change + Lake Tahoe Release. Net inflow used due to complexities with estimating Lake Tahoe evaporation and precipitation.

Marlette Lake Inflow (2) = Marlette Lake Inflow, observed + Marlette Lake storage change

Donner Lake inflow (2) (externally adjusted by US Water Master*) = Donner Lake storage change + Donner Lake Release + Lake Evaporation – Lake Precipitation

Martis Creek Reservoir inflow (2) (externally adjusted by US Water Master*) = Martis Creek Reservoir storage change + Martis Creek Reservoir Release + Lake Evaporation – Lake Precipitation

Prosser Creek Reservoir Inflow (2) (externally adjusted by US Water Master*) = Prosser Creek Reservoir storage change + Prosser Creek Reservoir Release + Lake Evaporation – Lake Precipitation

Independence Lake Inflow (2) (externally adjusted by US Water Master*) = Independence Lake storage change + Independence Lake Release + Lake Evaporation – Lake Precipitation

Stampede Reservoir Local Inflow (2) (externally adjusted by US Water Master*) = Stampede Reservoir storage change + Stampede Reservoir Release + Lake Evaporation – Lake Precipitation – Independence Lake Release + Sierra Valley Diversion

Boca Reservoir Local Inflow (2) (externally adjusted by US Water Master*) = Boca Reservoir storage change + Boca Reservoir Release + Lake Evaporation – Lake Precipitation – Stampede Reservoir Release

Little Truckee River above Boca Reservoir (2) (externally adjusted by US Water Master*) = Independence Lake Inflow (2) + Stampede Reservoir Local Inflow (2) + Boca Reservoir Local Inflow (2)

Truckee R above Farad Sidewater (2) (externally adjusted by US Water Master*) = Truckee River at Farad, observed – Boca Creek Reservoir Release – Prosser Creek Reservoir Release – Donner Lake Release – Martis Creek Reservoir Release – Lake Tahoe Release

Truckee River at Farad (2) (externally adjusted by US Water Master*) = Donner Lake inflow (2) + Martis Creek Reservoir inflow (2) + Prosser Creek Reservoir Inflow (2) + Independence Lake Inflow (2) + Stampede Reservoir Local Inflow (2) + Boca Reservoir Local Inflow (2) + Truckee R above Farad Sidewater (2)

East Walker River near Bridgeport (2) = East Walker River near Bridgeport, observed + Bridgeport Reservoir storage change

L Humboldt R nr Paradise Valley (2) = L Humboldt R nr Paradise Valley + Chimney Creek Reservoir storage change

Owyhee River near Gold Creek (2) = Owyhee River near Gold Creek + Wildhorse Reservoir storage change

Lake Powell Inflow (2) (externally adjusted by Bureau of Reclamation for major upstream reservoirs, but not trans-basin diversions to Missouri or Rio Grande)

*Externally adjusted US Water Master data comes from Hydrologic Flow Report which accounts for precipitation and evaporation from each reservoir:
http://www.troa.net/reports/wm_hydrologicflow/