USDA United States Department of Agriculture

Natural Resources Conservation Service

Nevada Water Supply Outlook Report April 1, 2023


February 23, 2023

Photo Credit: Jeff Anderson

Massive March Produces All-time Snowpack Records

The Sierra Nevada and Great Basin saw record March snow accumulation on top of already staggering snow amounts. April 1st snow measurements set new records at many locations across the region. To see how much snow was added between the last two snow surveys compare the yellow and orange signs on the tree in the background of the pictures. Above are Evan Smith and Valerie Bullard, NRCS Snow Surveyors from Grass Valley, California. Their February 23rd measurement at Rubicon #1 snow course in the Lake Tahoe Basin on averaged 150 inches (12.5 feet) of snow depth containing 57 inches of snow water content. By the next survey on March 30th (right) the marker signs are nearly buried. This measurement recorded snow being 223 inches (18.5 feet) deep containing 88.9 inches of water content. The measurement was 223% of the April 1 median and represents a frozen reservoir equal to 7.5 feet of water sitting on the mountainside.


March 30, 2023

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 bain, followed by its sub-basins, then the next main basin.

For questions contact:

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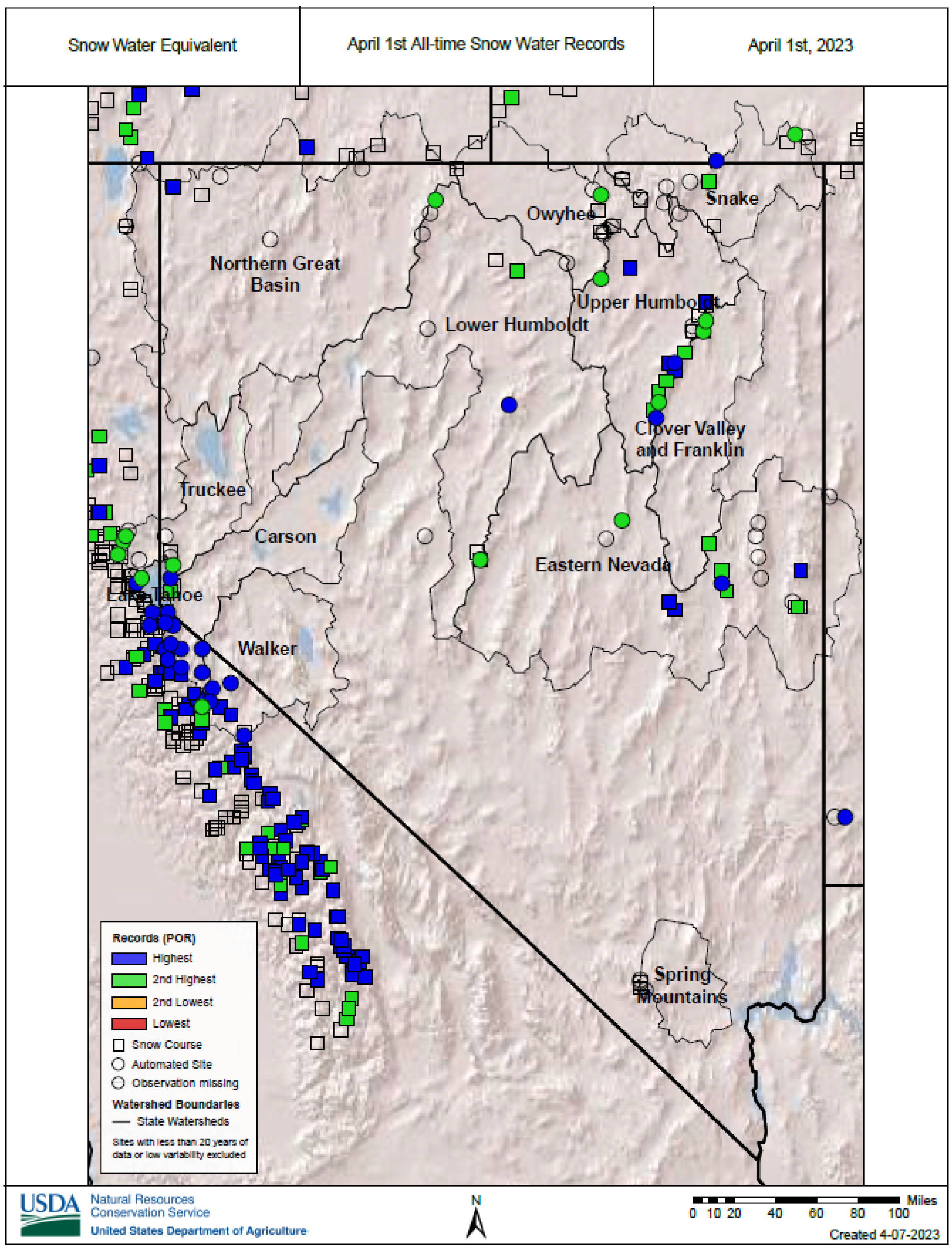
April 1, 2023

SUMMARY

After four months of above normal precipitation, winter 2023 flexed its muscles and produced the biggest March snow accumulation on record. April 1 snowpack measurements shattered all-time records across the Sierra Nevada and Great Basin (Figure 1). Some records extend back 80 to over 100 years and surpass measurements made in big winters such as 1952, 1969, 1983, 2011 and 2017. April 1 snowpacks are 218-306% of normal in the Eastern Sierra, 202-293% across northern Nevada, 158% in the Upper Colorado Basin and 532% in the Spring Mountains. Streamflow forecasts for April-July are all twice median with some forecasts more than ten times median. Expect high water for an extended period well into summer, over snow travel in the backcountry, and excellent carry over storage in reservoirs next fall. Keep reading to see photos documenting this historic winter.

Figure 1: April 1, 2023 snow water equivalent records based on period of record (POR) data.
Blue: April 1, 2023 is the highest ever measured. Green: April 1, 2023 is the 2^{nd} highest on record.



Notable April 1 Measurements:

Truckee Basin

Mount Rose 3^{rd} highest in 112 yrs

Little Valley 2^{nd} highest in 80 yrs

Lake Tahoe Basin

Marlette Lake highest in 107 yrs

Hagans Meadow highest in 105 yrs

Heavenly Valley highest in 55 yrs

Carson Basin

Blue Lakes highest in 105 yrs

Upper Carson Pass highest in 94 yrs

Poison Flat highest in 65 yrs

Walker Basin

Sonora Pass highest in 89 yrs

Willow Flat highest in 88 yrs

Lobdell Lake highest in 60 yrs

Humboldt Basin

Lamoille 1, 3 & 5 highest in 85-91 yrs

Tremewan Ranch highest in 81 yrs

Trout Ck Lower highest in 78 yrs

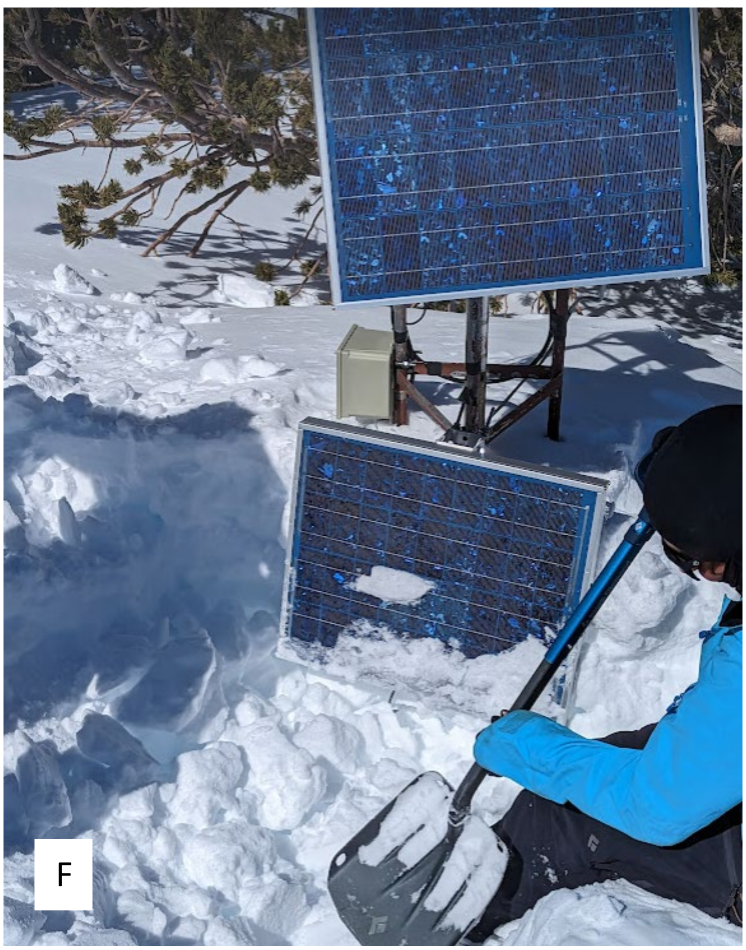
Eastern Nevada

Murray Summit 2^{nd} highest in 84 yrs

Baker Ck #2 is 2^{nd} highest in 80 yrs

Ward Mountain highest in 67 yrs

A. Willow Flat Snow Course - Walker Basin. Matt Cole, NRCS, beside buried snow course marker. Snow 7.5 feet deep previous record 6 feet. *Credit: Jeff Anderson*
B. Marines at Iwo Jima? No, Scott Fennema & Dave Wathen, Truckee-Carson Water Master’s Office, raise snow tubes to measure 223in (18.5ft) of snow at Rubicon #1 snow course – Lake Tahoe Basin. *Credit: Jeff Anderson*
C. Nate Bech and Spencer Rogers, USFS Bridgeport Ranger District, measure Sawmill Ridge snow course – Walker Basin. The yellow snow course sign in the background is nearly buried. Snow 12 ft deep, previous record was 7.75ft. *Credit: Joe Soccio*
D. Great Basin National Park surveyor stands above snow course marker at Baker Creek #3 – Eastern Nevada Snow 9.25ft deep. *Credit: Gretchen Baker*

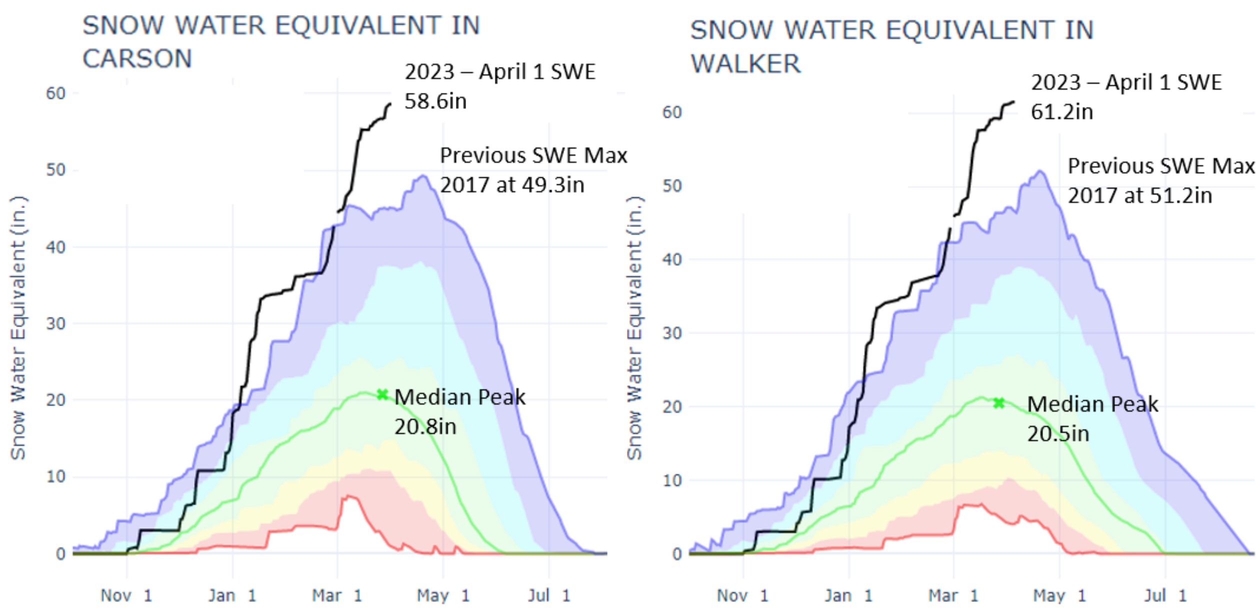


E. Menacing snow drifts hang over Mount Rose Highway. *Credit: Jeff Anderson*
F. Sammy Rubin, USFS Bridgeport Avalanche Center, digs out solar panels at Leavitt Lake SNOTEL. Panels are mounted 4 feet above a 16 foot tall electronics shelter. *Credit: Joe Soccio*
G. Jeff Anderson, NRCS, unplugging Blue Lakes SNOTEL's 22ft tall precipitation gage with an extension pole. Gage filled with ~10 feet of snow which had to be mixed in. *Credit: Chris Savastio*

SNOWPACK

Snow accumulation in March was the highest on record across the region. April 1 snowpacks are 218-306% of normal in the Eastern Sierra, 202-293% across northern Nevada, 158% in the Upper Colorado Basin and 532% in the Spring Mountains. Snow amounts are staggering especially in the Sierra where Leavitt Lake SNOTEL in the Walker Basin leads the list with an April 1 measurement of 264 inches (22 feet) of snow depth containing 108.8 inches (9 feet) of water content. Amazing as that is, Leavitt Lake still needs to gain more snow to beat its all-time snow water peak of 122.1 inches of water content set on April 21, 2017. Besides Leavitt Lake nearly every other SNOTEL in the Carson or Walker basins has already surpassed all previous peak snow water amounts for any year back to 1981. Current snow water amounts in the Carson and Walker basins (Figure 2) have completely obliterated the previous maximum peak snow water equivalent amounts achieved on April 21, 2017 by about 10 inches of water or nearly 20% more snow. The Lake Tahoe, Truckee and Upper Colorado basins are also approaching all-time peak snow water amounts based on daily SNOTEL data.

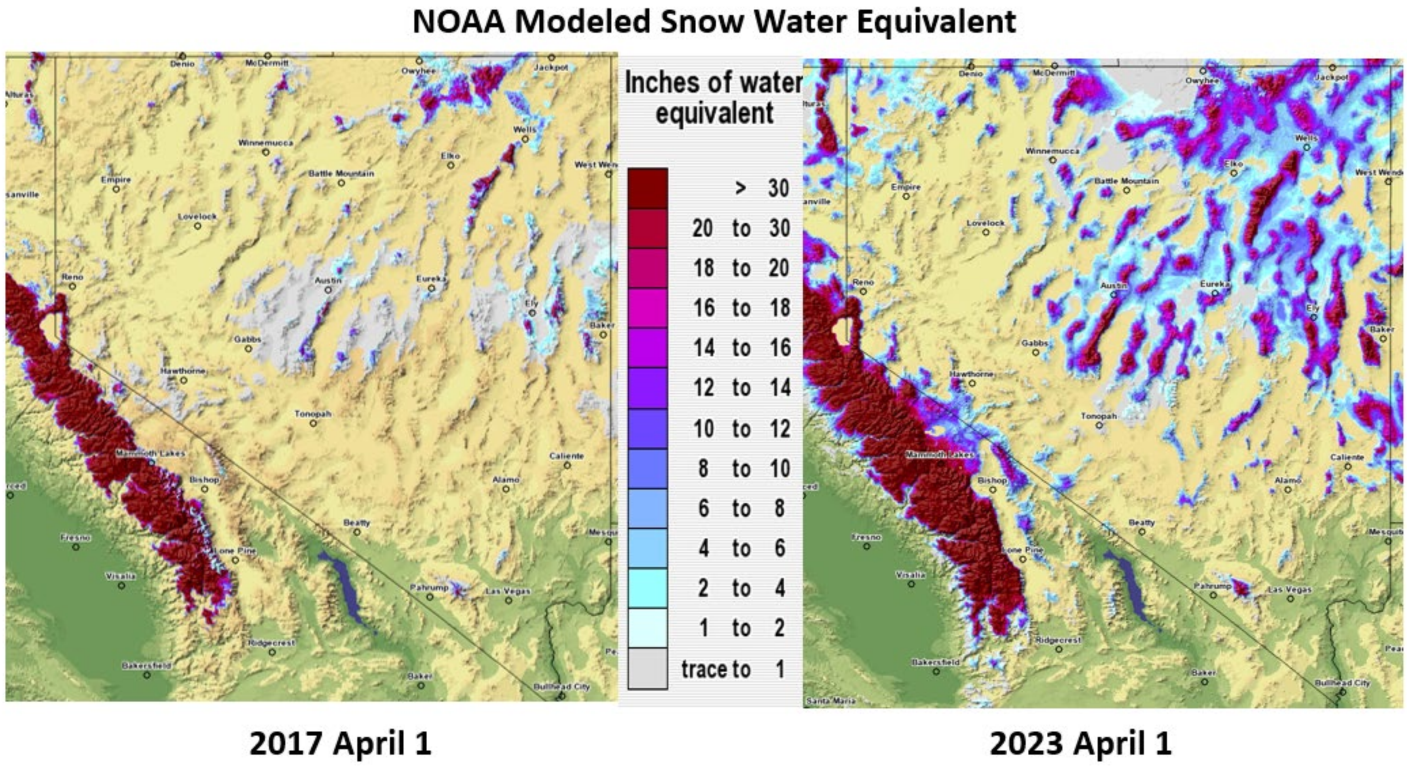
Figure 2: Basin-wide snow water in the Carson and Walker basins compared to historical data range.



The NRCS snow monitoring network is focused on mid-to-high elevation locations in the mountains that typically build seasonal snowpacks. Cold storms this winter built deep snowpacks at elevations well below the NRCS network. The lowest elevation SNOTEL in the Sierra basins is Spratt Creek at 6,063 feet in the Carson Basin. It is normally melted out by now, but this year measured 21.6 inches of snow water on April 1, the highest in the last 43 years. In the Humboldt Basin, the lowest elevation snow course is Tremewan Ranch (5,700 feet) which still had 6.8 inches of snow water at the end of March, the highest in 81 years of measurement. In Eastern Nevada the lowest site is Murray Summit at 7,285 feet. Murray's April 1 measurement had 11.5 inches of snow water which ranked second highest in 84 years. More snow extends well below these elevations and is not represented by the NRCS network. Figure 3 shows NOAA snow covered area maps below comparing April 1 snowpacks in 2023 to 2017. In 2017 most of the low elevation snow was gone by now, well before the high elevation snow started melting. This year the low snow adds up to a much larger snow-covered area than typically exists at this time of year. This is a flooding concern since melt could occur across a much larger area if there is a sudden warm-up. The NOAA River Forecast Center and the National Weather Service are the federal agencies that forecast flooding. To track 5-day river forecasts visit the NOAA California-Nevada River Forecast

[Center website](#) and click on the stream gage of interest. With so much snow to melt across the region its certain that the high-water season will be prolonged. Flooding is probable but impacts are specific to the basin and future weather. Report flooding impacts to your local National Weather Service office. The Reno National Weather Service Office recently provided an excellent webinar which address flooding potential. The presentation can be viewed [here.](#)

Figure 3: Modeled snow water content across Nevada April 1, 2017 (left) vs April 1, 2023 (right), source: [NOAA](#)



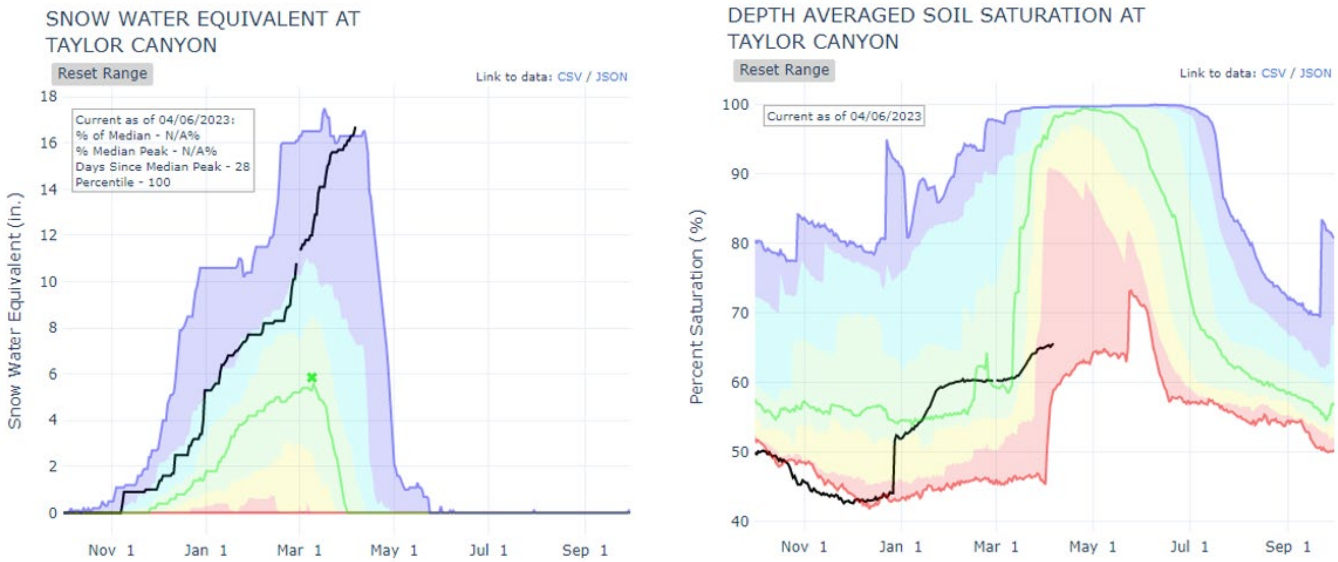
PRECIPITATION

March was the fifth consecutive month with above normal precipitation across the state. Water year precipitation on April 1 is 171-237% of median in the eastern Sierra basins, 149-206% in the Humboldt, Clover Valley, Spring Mountains and Eastern Nevada. Amounts are a bit less at 126-128% in the Northern Great Basin, Owyhee and Snake basins along Nevada's northern border. Record breaking snow accumulation starting at the end of February and continuing through March resulted in precipitation gages in the Sierra getting re-plugged with snow. The plugs at Palisades Tahoe, Rubicon #2 and Mt Rose Ski Area SNOTEL sites were cleared during monthly snow surveys. Higher sun angles and blue-sky days have helped clear CSS Lab, Ward Creek #3 and Hagans Meadow SNOTELs. Precipitation data from plugged gages appears as "missing" in public reports until daily data is estimated by a hydrologist using snow pillow accumulation. This estimation technique has proven reliable over other big winters and should not be a cause for concern. The missing data also causes decreases on the basin precipitation charts. Eventually the precipitation will register either after a site visit or once conditions warm up. Daily data are then redistributed across the plugged period. SNOTEL issues, such as precipitation gage plugging, can be tracked on the [SNOSTAT map](#).

SOIL MOISTURE

Colder than normal temperatures and the lack of rain or snowmelt means not much has changed in terms of soil saturation levels. Normally by April significant melt has already occurred at lower elevation sites and basin saturation starts to increase. Since melt has not started at most low elevation sites basin soil moisture this month has fallen below median levels. As an example, at 6,325ft Taylor Canyon is the lowest SNOTEL in the Humboldt Basin. Figure 4 shows snow water is still climbing and near its all-time peak amount, meanwhile only modest increases in soil moisture have occurred. Soils are far from the saturated conditions typical by April 1.

Figure 4: Snowpack & soil moisture at Taylor Canyon SNOTEL (6,325ft), the lowest site in the Humboldt Basin.



RESERVOIRS

Reservoir managers are watching streamflow forecasts to make decisions on storage levels. Reservoirs with more storage space are still gaining, while smaller reservoirs are being drawn down to create space for high inflows in the coming months. Monthly storage changes can be tracked here. In the Tahoe and Truckee basins Stampede, Prosser, and Boca reservoirs are all expected to fill, however current forecasts are not yet high enough to fill Lake Tahoe. Lake Tahoe was half a foot below its rim last fall so nearly filling is an amazing come-back. In the Carson Basin, there is more than enough water to fill Lahontan. Mangers have drawn it down and excess water is being dumped into the desert using infrastructure built in 2017 to divert water around Fallon. Managers in the Walker basin have also drawn down Topaz and Bridgeport reservoirs due to the extreme snow amounts in that basin. In the Humboldt Basin, water is again flowing the length of the river to Rye Patch Reservoir. For readers of last month's report the no flow period failed to beat 2015's record. Flow returned at Imlay on March 4th. Rye Patch storage increased 2.1 kaf in March, but nearly 183 kaf of storage space remains available. This month's 50% exceedance forecast for the Humboldt River near Imlay is 400 kaf. The driest April-July forecast (90% exceedance) predicts 272 kaf.

STREAMFLOW FORECASTS

April 1 streamflow forecasts for the April-July period are very high. Neary every forecast is above 200% of median, many are 300-600% of median and a few >1000% of median. In previous reports it has been discussed how Great Basin streams have skewed datasets with an extremely wide range of volumes seen between a handful of very wet years and many more years with lower runoff. The median is the middle value of the dataset and represents a volume that is exceeded half the years. 2023 is one of the extremely wet years. A forecast for

300% of median means this total streamflow volume during the April-July period is expected to be three times the median. Every year, but especially this year, its important to focus on the volume and not just the percentage. Comparing volumes to past years provides perspective. Snowmelt runoff may break previous records this spring. Table 1 highlights each forecast that has exceedance volumes that break the standing record April-July streamflow. With all-time record snowpacks in the Carson and Walker basins, streams in these basins have the best chance of setting new records. Streams coming off the Ruby Mountains may also set records.

Table 1: Streamflow forecasts with volumes which exceed record April-July volumes.

Forecast Point	Forecast Period	April 1, 2023 Forecast Exceedances - KAF <---drier future-----------wetter future--->					Record	Record Year
		90%	70%	50%	30%	10%		
Marlette Lake Inflow	Apr-Jul	2.8	3.1	**3.3**	3.5	3.8	3.5	1983
Galena Creek	Apr-Jul	8.8	9.5	**10**	11	11	9.3	1996
Independence Lake Inflow	Apr-Jul	21	22	**23**	24	25	25	1983
EF Carson R nr Gardnerville	Apr-Jul	490	515	**530**	545	570	485	2017
WF Carson R at Woodfords	Apr-Jul	130	137	**142**	147	154	153	1907
Kings Canyon Creek	Apr-Jul	0.92	1.1	**1.3**	1.4	1.6	1.5	1983
Ash Canyon Creek	Apr-Jul	2.5	2.8	**3**	3.2	3.6	3.2	2017
Carson R nr Carson City	Apr-Jul	510	540	**560**	585	615	558	2017
Carson R nr Fort Churchill	Apr-Jul	515	550	**570**	590	625	545	2017
E Walker R nr Bridgeport	Apr-Aug	205	220	**230**	240	255	230	2017
W Walker R bk L Walker R nr Coleville	Apr-Jul	380	400	**415**	430	450	406	2017
W Walker R nr Coleville	Apr-Jul	385	405	**415**	430	445	376	2017
Lamoille Creek	Apr-Jul	47	53	**57**	61	66	51	1997
SF Humboldt abv Tenmile Ck	Apr-Jul	157	176	**190**	205	225	162	2019
Lehman Creek nr Baker	Apr-Jul	5.3	6.1	**6.6**	7.1	7.9	7.8	2005
Steptoe Creek nr Ely	Apr-Jul	7.6	8.7	**9.4**	10	11	8.8	1983

Forecast Volume Equals or Exceeds Existing Record

NRCS streamflow forecasts provide a total volume of runoff expected during the April-July snowmelt runoff period. The potential for flooding this spring is likely, however the NRCS runoff forecasts are volumetric and do not provide guidance on peak discharge magnitude at stream gage locations. Flood forecasts can be obtained from the National Weather Service and the NOAA California-Nevada River Forecast Center.

Forecasting streamflow for the Humboldt River is extremely challenging this year. There are not a lot of comparison years that flip-flopped from so dry to so wet. A big wildcard is the robust low elevation snowpack that extends well below the NRCS monitoring network and has persisted very late into what is normally the melt-season. One of the best comparison periods might be water years 1981, 1982 and 1983. Water year 1981 had low snow (56%), while 1982 flipped and had a very good snowpack (157%). April-July observed flows at Imlay in 1982 totaled 212 kaf. This year's snowpack far exceeds 1982, but the 2022 runoff was not as good as 1981. 1983 had a near record snowpack (174%) and April-July volumes at Imlay increased to 641 kaf. This season's low elevation snowpack is bound to play an important role. When it melts, will it prime the system enough to produce volumes that exceed 1982 and by how much? Table 2 shows that this month's forecast exceedances are generally greater than 1982 and less than 1983.

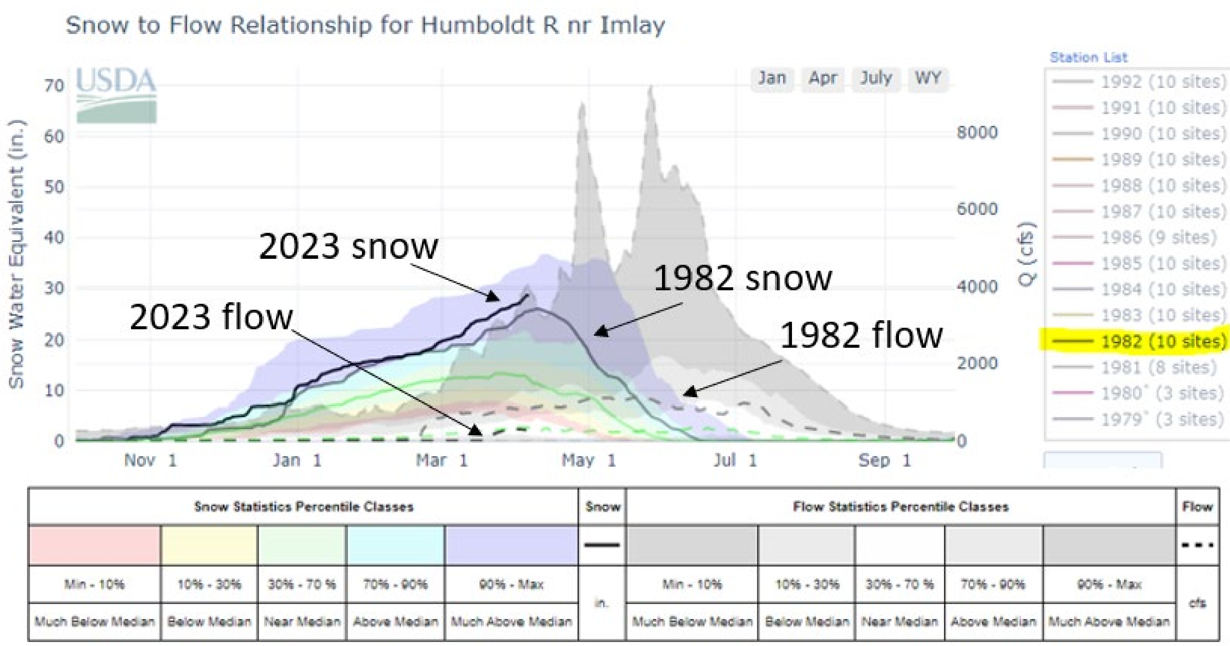
Table 2: Humboldt River streamflow forecasts with volumes compared to 1982 and 1983 volumes.

Forecast Point	Forecast Period	April 1, 2023 Forecast Exceedances - KAF <---drier future-----------wetter future--->					1982 KAF	1983 KAF	2019 KAF
		90%	70%	50%	30%	10%			
Humboldt R nr Elko	Apr-Jul	220	260	290	320	360	211	301	286
Humboldt R at Palisades	Apr-Jul	360	440	500	565	660	315	599	487
Humboldt R nr Comus	Apr-Jul	320	395	450	510	600	264	735	386
Humboldt R nr Imlay	Apr-Jul	270	345	400	460	555	212	641	253

Greater than 1982 **Greater than 1983**

To track snow levels compared to river flows this spring use the interactive [NRCS Snow-to-Flow charts](). These plots allow users to compare this year's snowpack and streamflow to other historic years for each forecast point. Figure 5 provides an example snow-to-flow plot for the Humboldt River near Imlay. One important note, streamflow on these charts is not adjusted for upstream reservoirs keep this in mind for other points.

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



UPCOMING EVENTS

Northern Nevada Streamflow, Reservoir and Weather Forecast Meeting

The public is invited to attend presentations by the NRCS, NWS, USBR, USGS.

When: April 11, 2023 1:30-3pm

In Person: Nevada Division of Water Resources; 901 S. Stewart St. Suite 2002, Carson City, NV

Virtual: [Teams Meeting]() Meeting ID: 231 308 011 126 Passcode: W75JLa

Contact: Nicole Goehring [ngoehring@water.nv.gov]() for more information

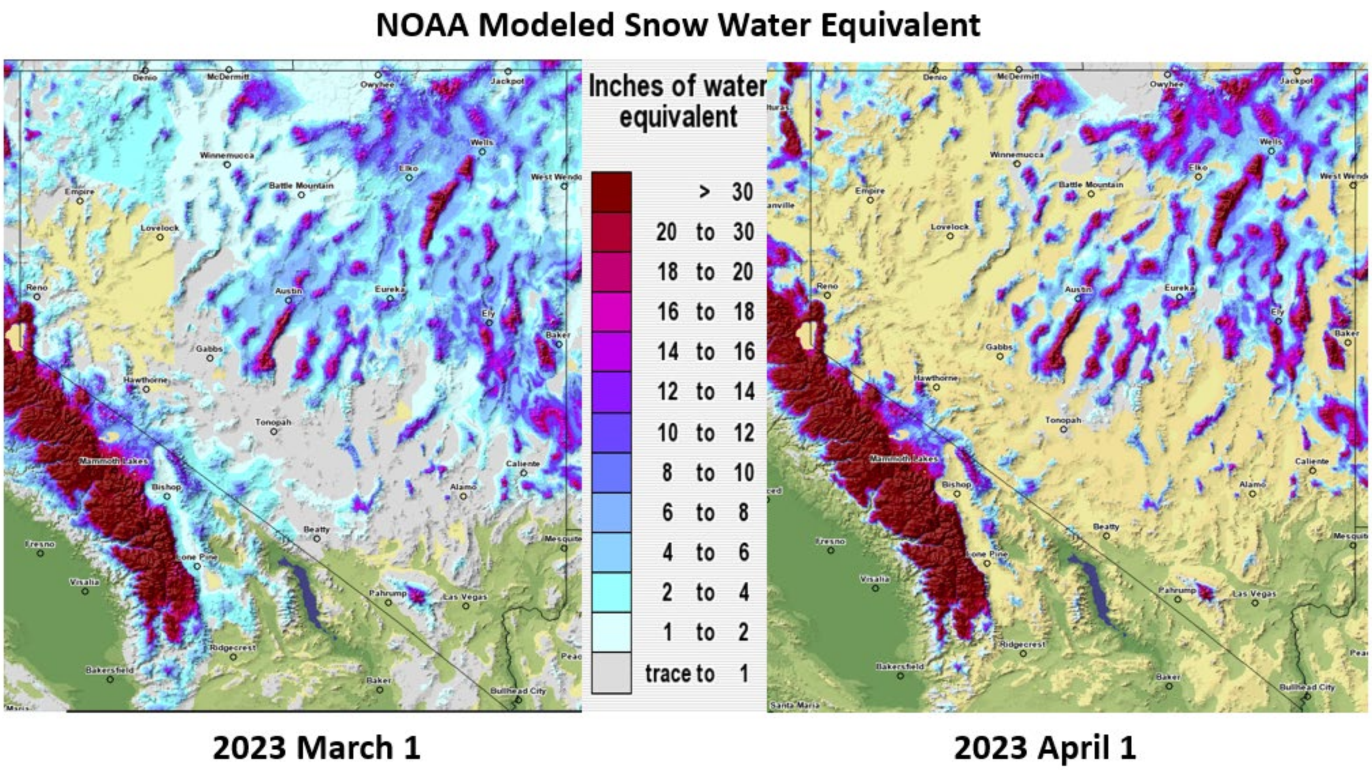
Western Snow Conference, April 17-20, 2023, Flagstaff, AZ - [link]()

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 March 1, 2023 map (left) shows modeled snow water equivalent across Nevada one month ago. Comparing to April 1, 2023 (right) the snow-covered area has shrunk, however the amount of snow cover on April 1 is still much larger than in most years.

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



Plant Growth: Wildflowers are blooming in Death Valley and southern Nevada and the lower hills in western Nevada are turning green with cheatgrass growth (Bromus tectorum) and annual forbs. Green-leaf manzanita (Arctostaphylos patula) is blooming on the Sierra foothills as snow melts recede. The Great Basin and Mojave Desert have a winter-spring dominated precipitation pattern, so plant growth starts early, usually in late January and early February while temperatures are cool and soil moisture is high. By mid-to-late June, most upland range species have produced and dispersed their seed, thus completing their life cycle. With the hot summer temperatures, the plants enter dormancy and leaves drop off or die back. Some of the shrubs in the Aster family produce flowers and seeds later in the summer (sagebrush- Artemisia spp., rabbitbrush – Ericameria spp.), but most of their stem and leaf growth occurs earlier in the year. Some shrubs and grasses have the ability to break dormancy with late summer rains and even flower again. Snow cover in northern Nevada is important for the shrubs because they typically have long, deep tap roots and shallow lateral roots. The slow melting of snow provides moisture deep in the soil profile and as the surface soils dry out, the roots start drawing moisture deeper in the profile allowing shrubs like sagebrush and rabbitbrush to complete their growth cycle.

Temperature and Precipitation: Table 1 below provides a summary of temperature and precipitation data from selected valley climate stations across the state for the month of March. March was below normal for temperature across all stations with Ely showing the greatest departure of 11.8 degrees below normal. The maximum temperature for the month at Reno was 61°F with a monthly low of 15°F. Elko had a March high of 53°F and low of -2°F. The highest temperature in March was 75°F at the Las Vegas airport climate station with a low of 37°F. Valley precipitation in March was above normal across the state with several stations reading more than an inch above normal. The snow that has melted combined with spring precipitation will give rangelands a break from the previous multi-year drought cycle.

Table 3: March summary of valley climate stations, source: http://www.rcc-acis.org/

Climate Station	March Average Temperature °F	March Departure from Normal °F	March Precipitation (Inches)	Precipitation Departure from Normal (inches)	Normal Average Temperature °F	Normal Precipitation (inches)
Reno airport	38.9	-7.7	1.95	1.15	46.6	0.8
Orovada	35	-6.5	1.64	0.6	41.5	1.04
Winnemucca	35.7	-6.9	1.89	1.02	42.6	0.87
Elko airport	29.7	-10.2	1.66	0.69	39.9	0.97
Ely	25.9	-11.8	2.42	1.44	37.7	0.98
Eureka	27.7	-10.3	2.15	1.18	38	0.97
Tonopah Airport	36.3	-7.5	0.82	0.3	43.8	0.52
Overton	53.1	-6.6	0.94	0.13	59.7	0.81
Las Vegas airport	54.7	-4.8	0.46	-0.05	59.5	0.51
Mina	40.3	-8.7	1.38	0.92	49	0.46
HIKO	41.4	-6.8	2.39	1.54	48.2	0.85
Minden	33.9	-8.6	3.33	2.08	42.5	1.25
Hawthorn	41	-7.5	1.36	0.89	48.5	0.47
Mercury 3	47.4	-6.4	1.58	0.97	53.8	0.61
Yerington	37.7	-7.8	2.23	1.74	45.5	0.49

Drought Status: Drought conditions continue to improve. The current U.S. Drought Monitor indicates 21.5% of the state is now out of drought conditions. Only 24% of Nevada is still experiencing D2-D4 drought.

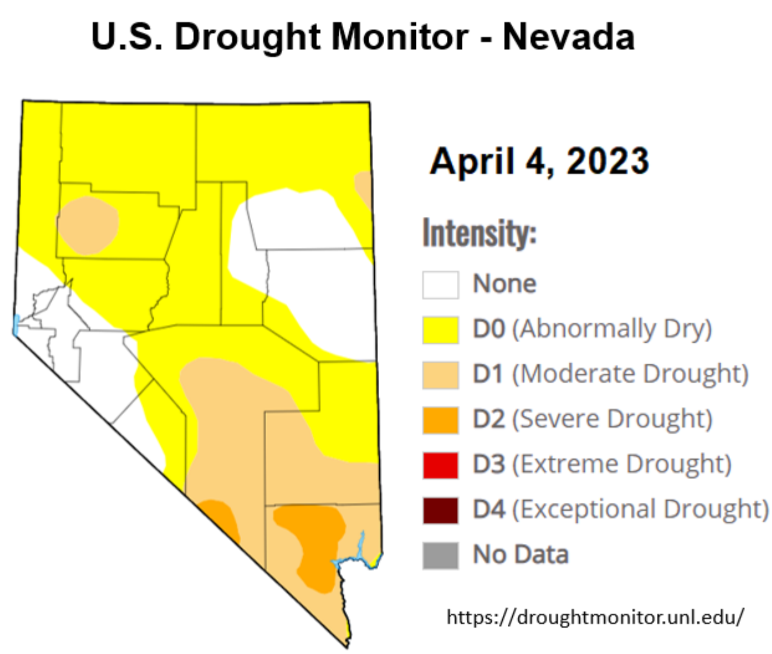
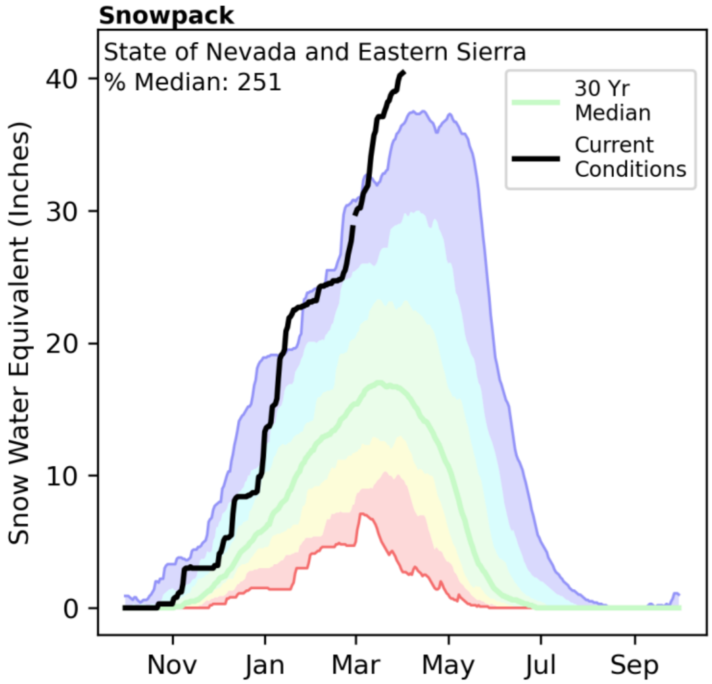
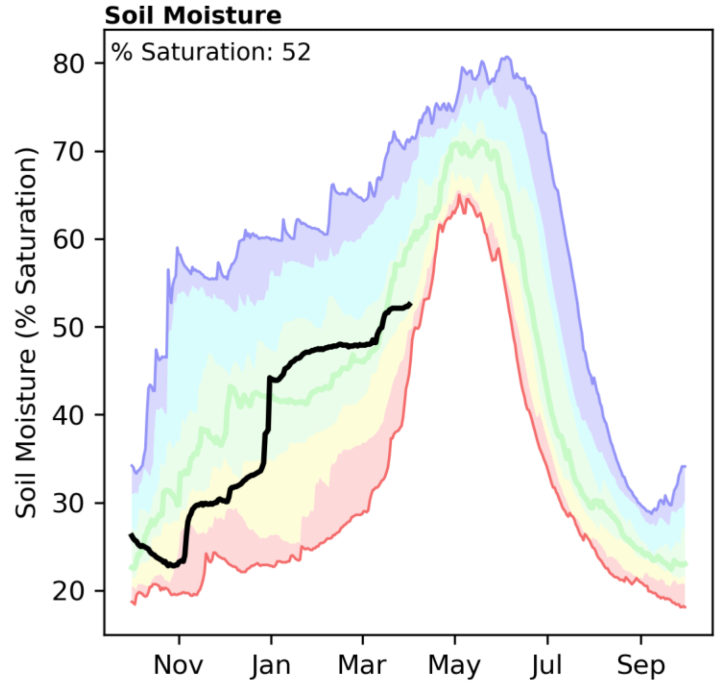


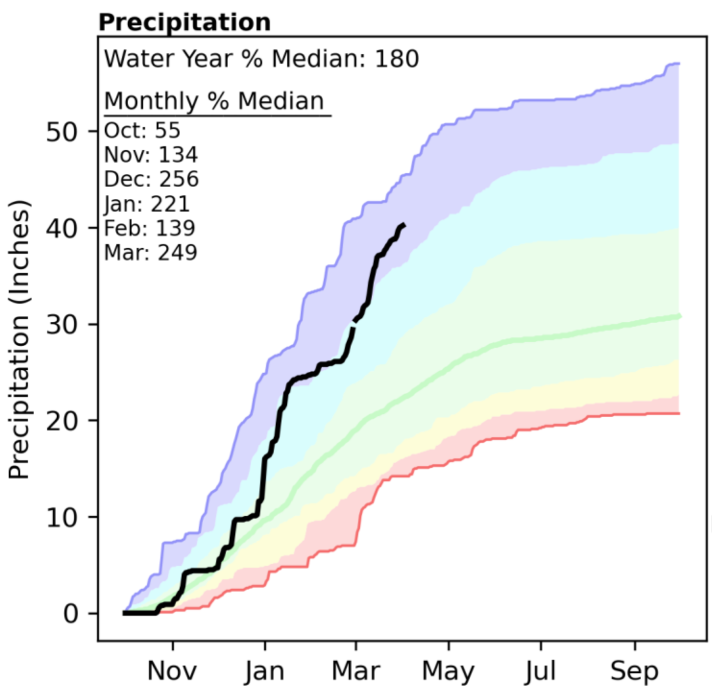
Figure 6: US Drought Monitor Map
https://droughtmonitor.unl.edu

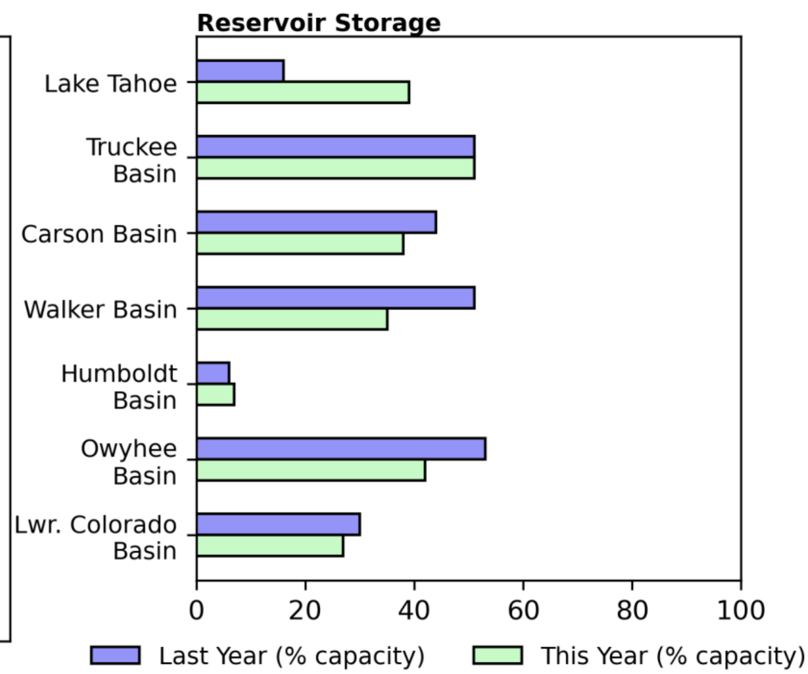
State of Nevada and Eastern Sierra | April 1, 2023

Snowpack in the State of Nevada and Eastern Sierra is well above normal at 251% of median, compared to 56% at this time last year. Precipitation in March was well above normal at 249%, which brings the seasonal accumulation (October-March) to 180% of median. Soil moisture is at 52% saturation compared to 66% saturation last year.



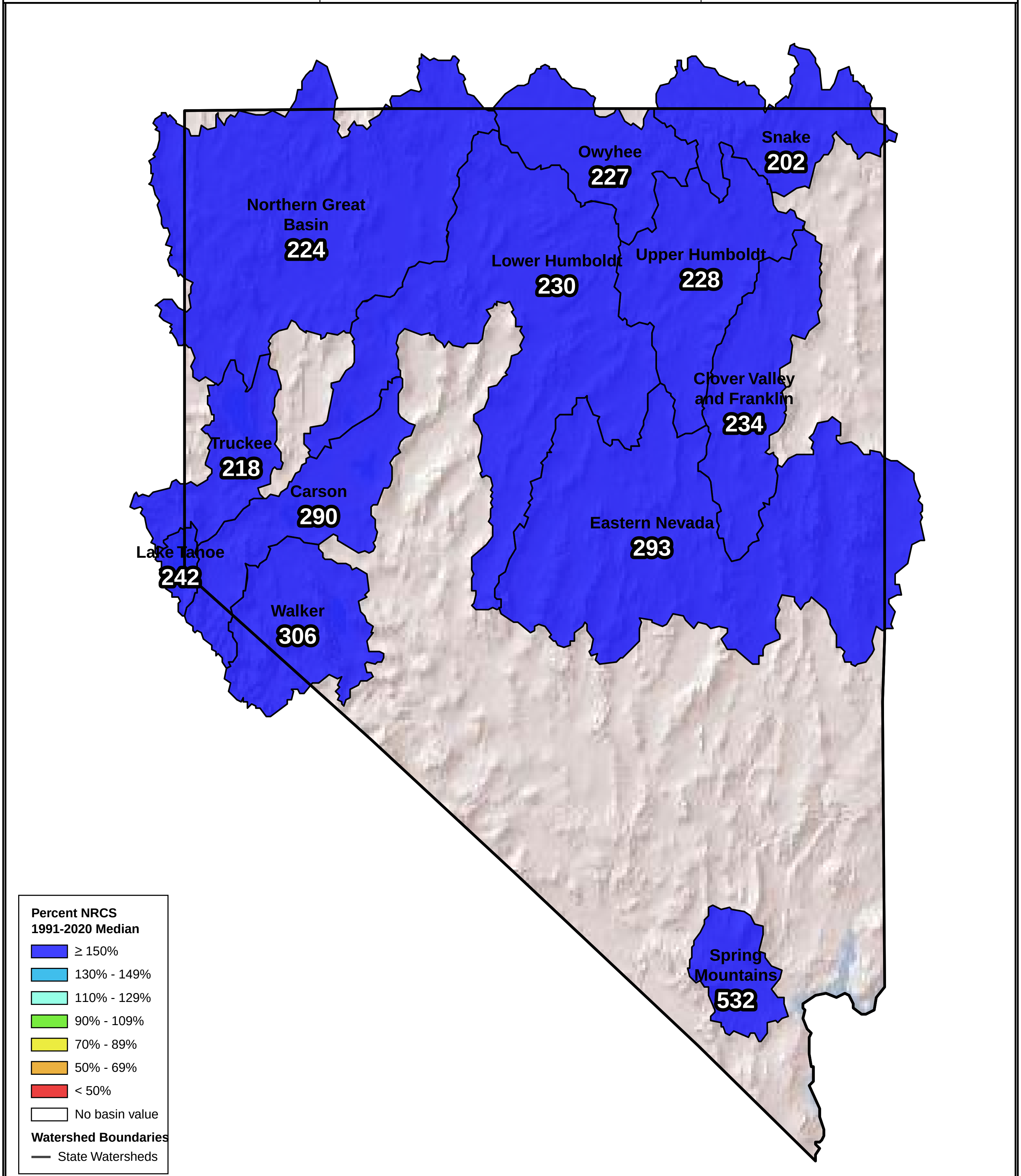






Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
For more information visit: 30 year normal calculation description

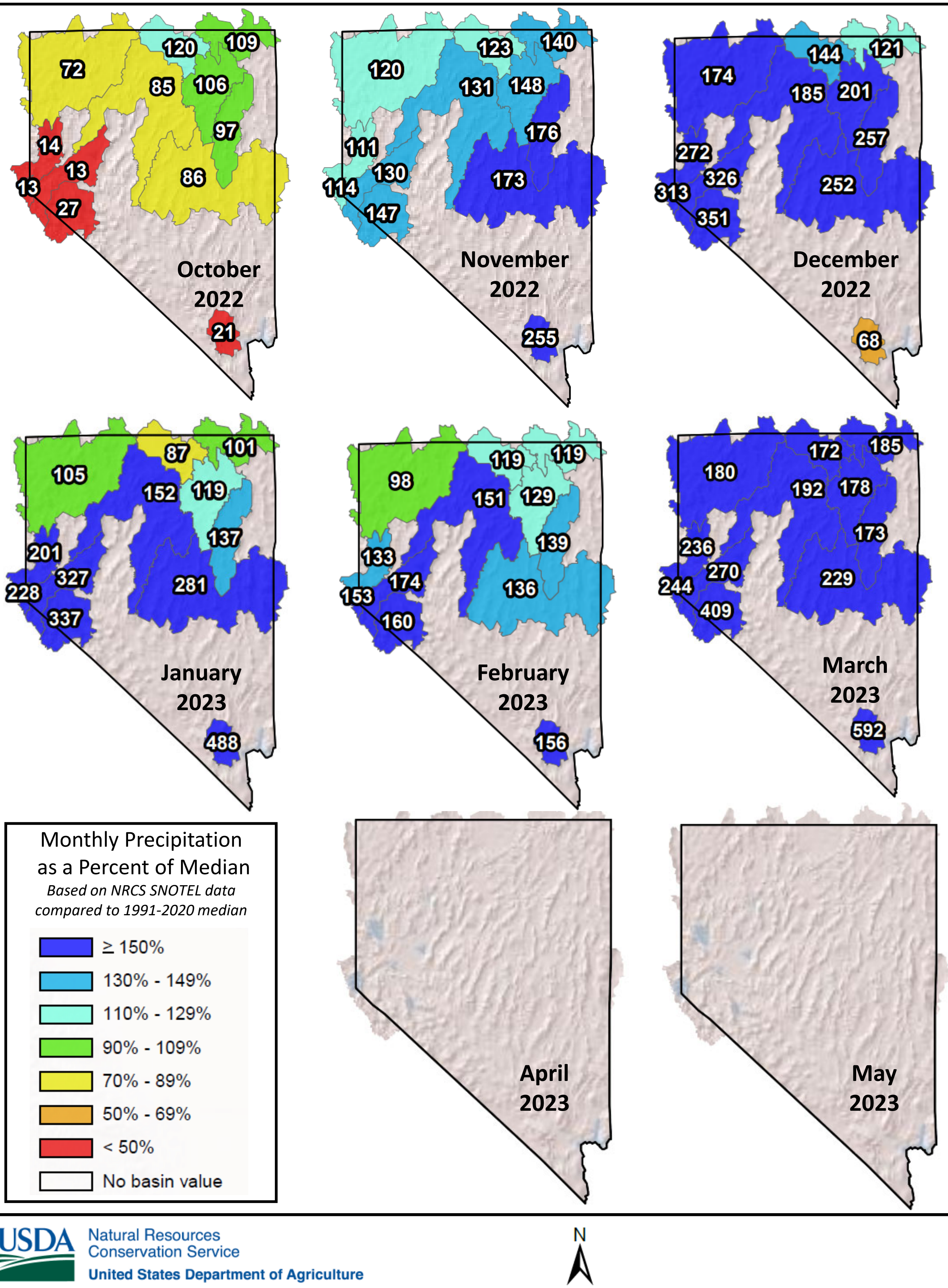
Snow Water Equivalent	Percent NRCS 1991-2020 Median	April 1st, 2023



USDA Natural Resources Conservation Service
United States Department of Agriculture

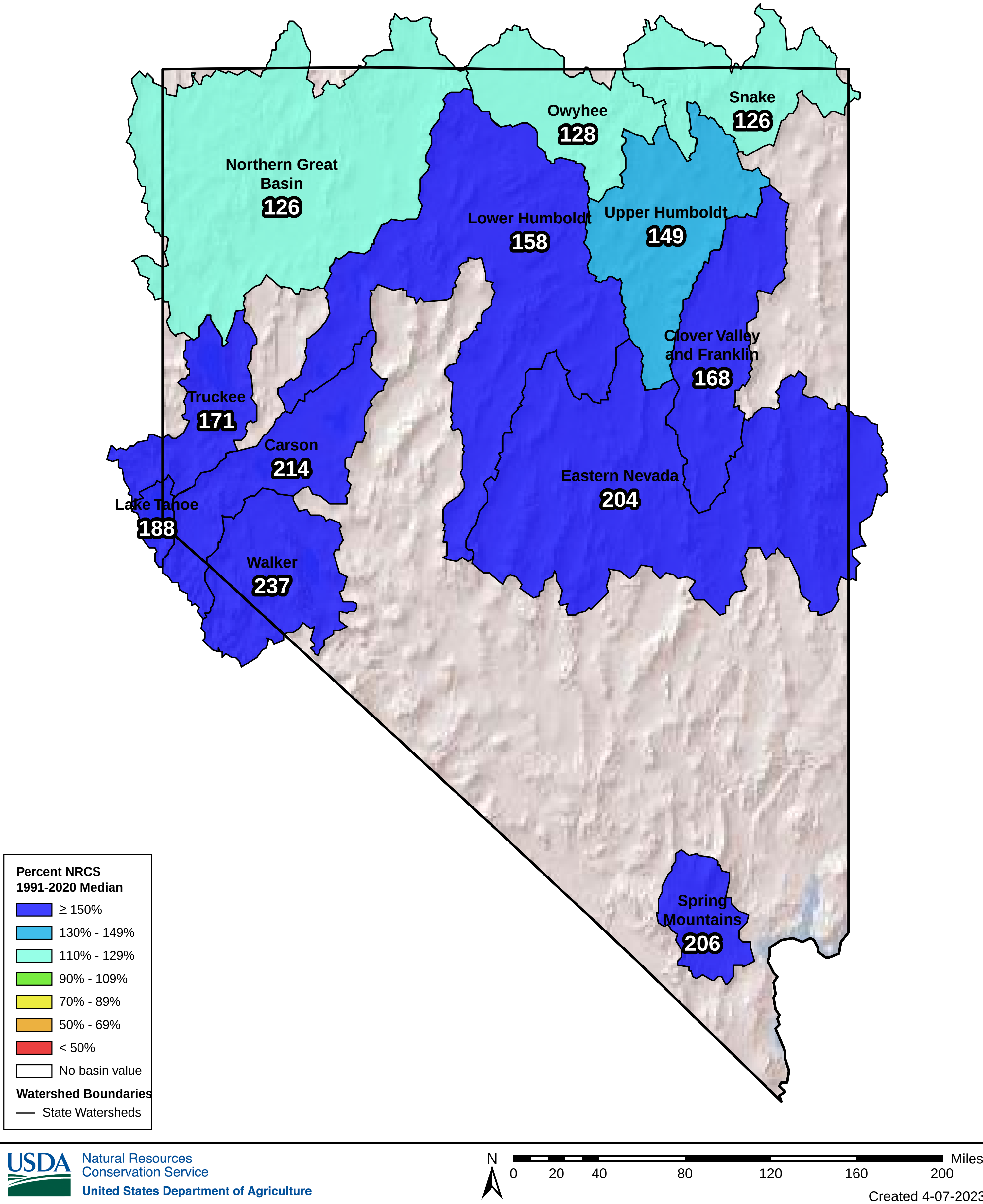
Created 4-07-2023

Monthly Precipitation as Percent of Median – Water Year 2023



USDA Natural Resources Conservation Service
United States Department of Agriculture

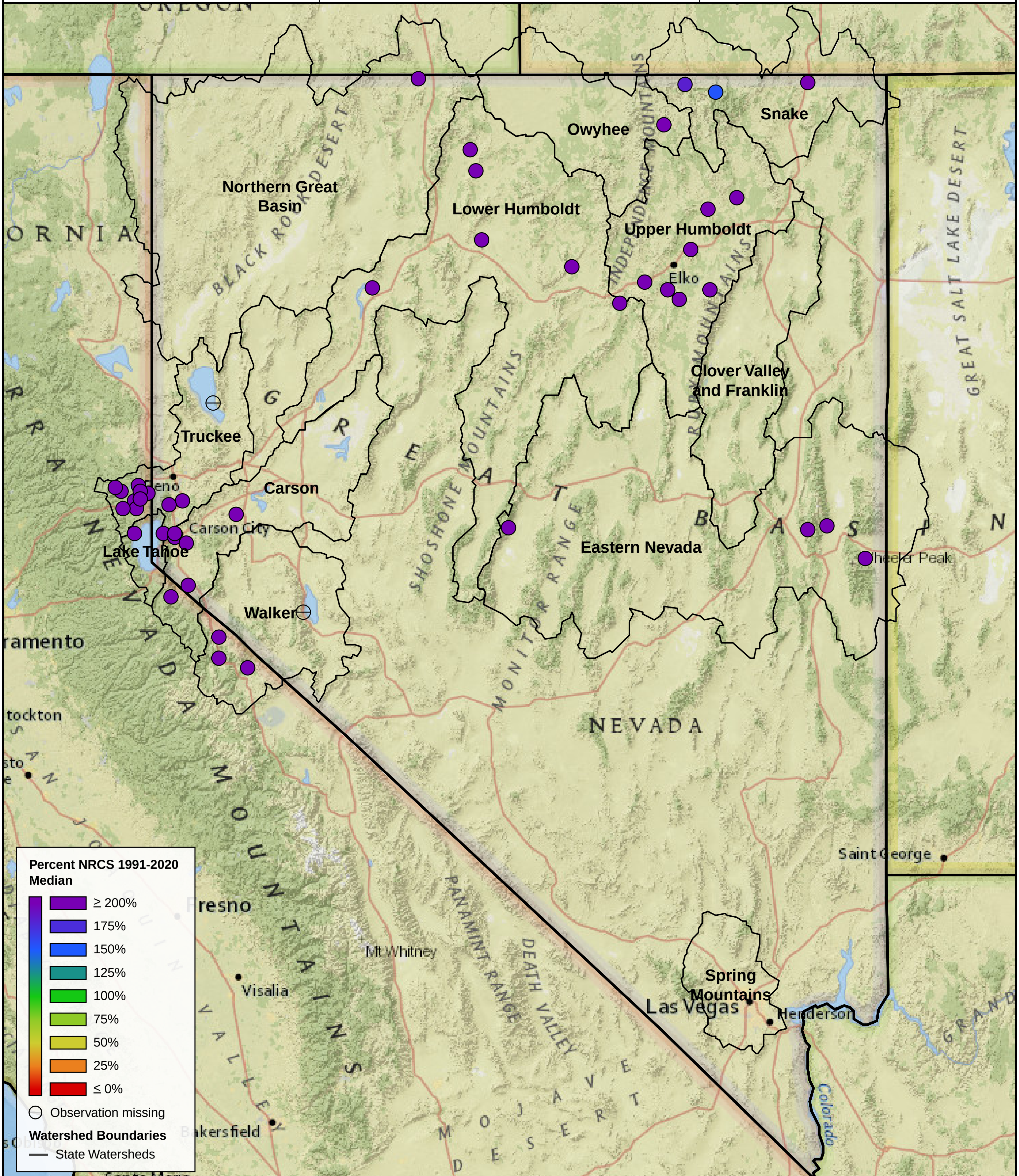
Water Year to Date Precipitation	Percent NRCS 1991-2020 Median	October 1, 2022 - March 31, 2023



USDA Natural Resources Conservation Service
United States Department of Agriculture

Created 4-07-2023

Streamflow Forecast Volume 50% Exceedance Probability	Percent NRCS 1991-2020 Median	Primary Period, April 1, 2023 *(April - July in most cases)*



USDA Natural Resources Conservation Service
United States Department of Agriculture

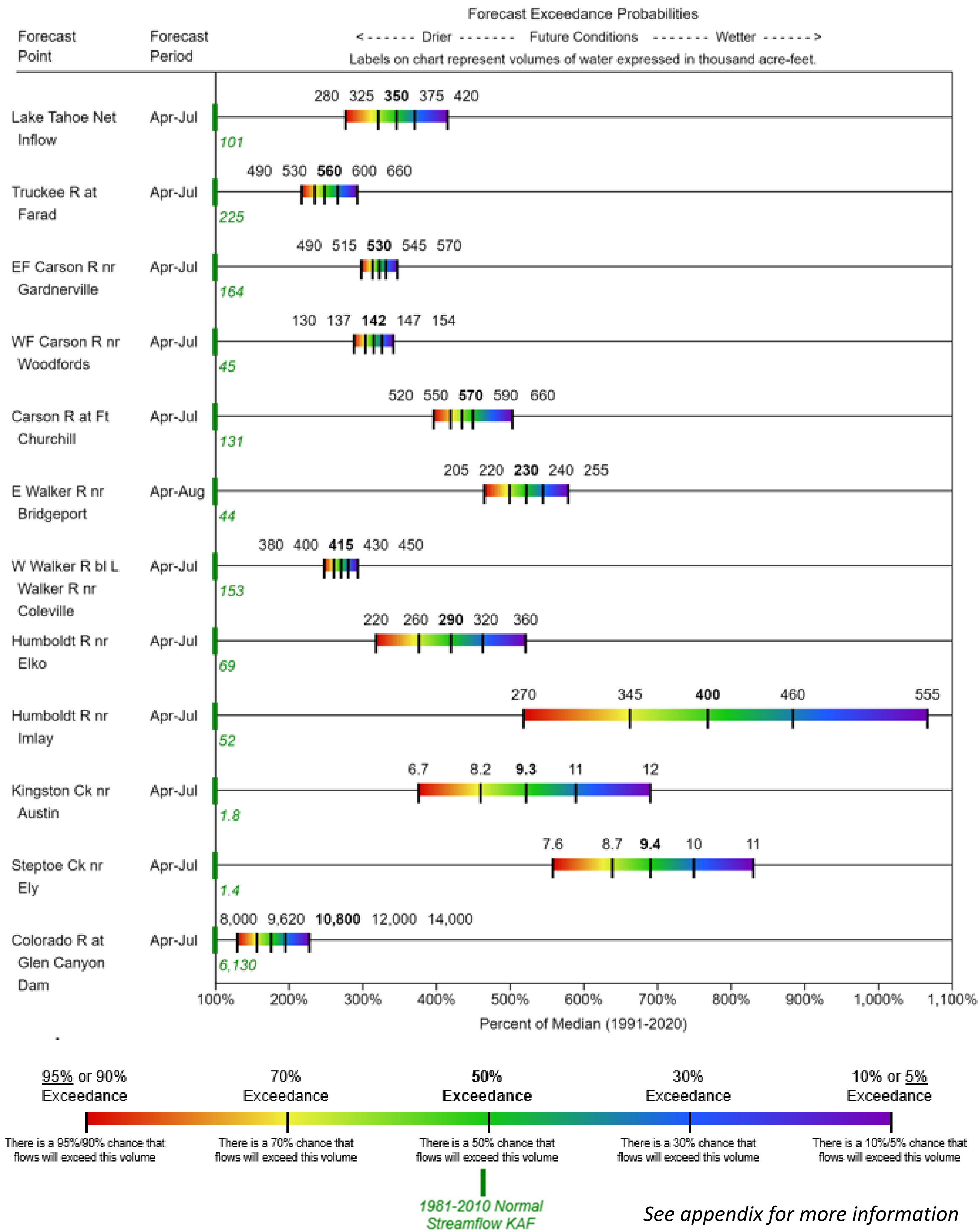
N

0 10 20 40 60 80 100 Miles

Created 4-07-2023

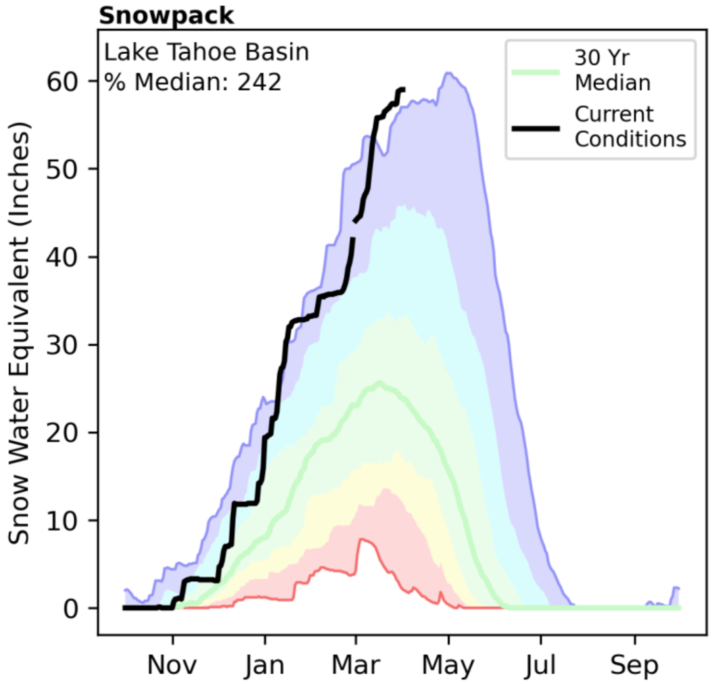
Streamflow Forecasts - State of Nevada Overview

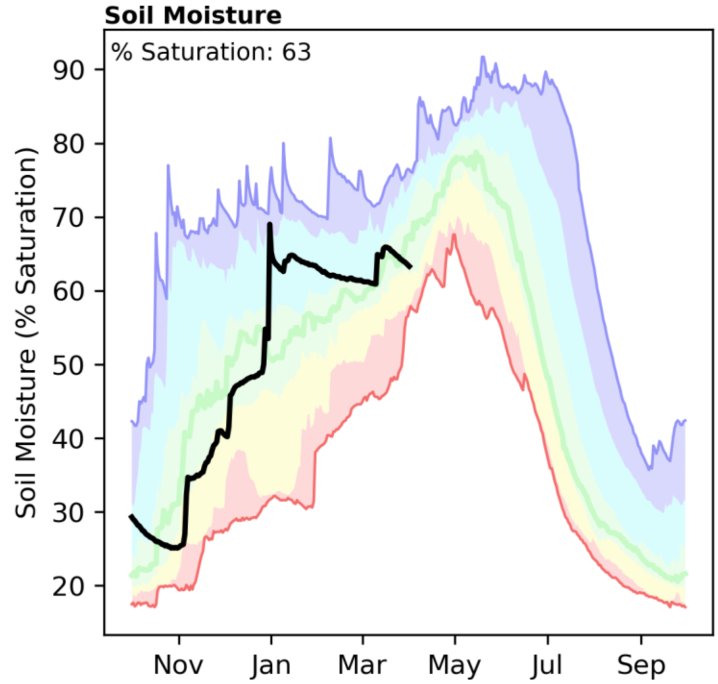
April 1, 2023

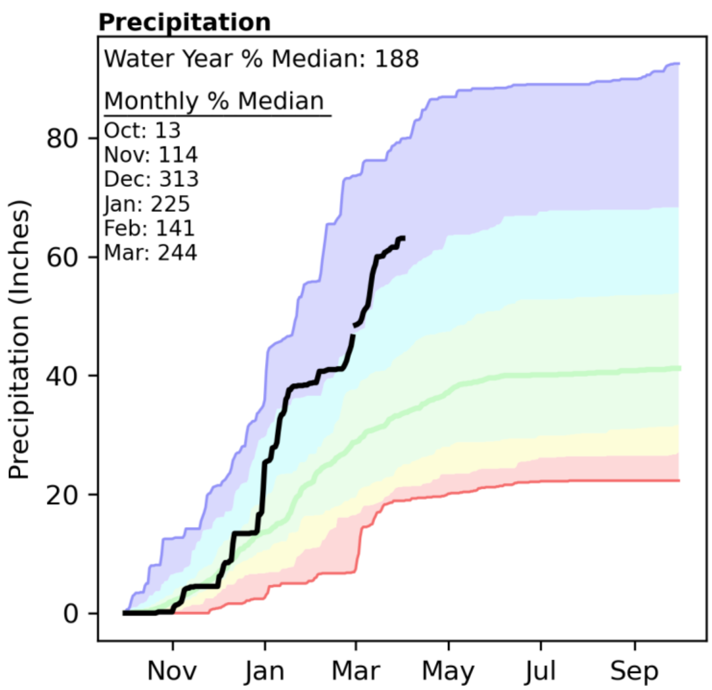


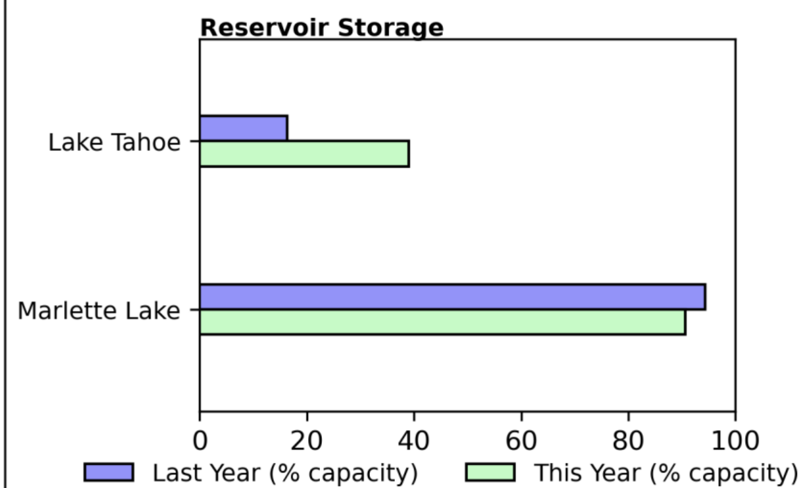
See appendix for more information

Snowpack in the Lake Tahoe Basin is well above normal at 242% of median, compared to 52% at this time last year. Precipitation in March was well above normal at 244%, which brings the seasonal accumulation (October-March) to 188% of median. Soil moisture is at 63% saturation compared to 74% saturation last year. Reservoir storage is 40% of capacity, compared to 18% 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.

Data Current As of: 4/7/2023 12:21:21 PM

Lake Tahoe
Streamflow Forecasts - April 1, 2023

Lake Tahoe	Forecast Period	Forecast Exceedance Probabilities For Risk Assessment / Chance that actual volume will exceed forecast: 90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Marlette Lake Inflow								
	APR-JUL	2.8	3.1	3.3	825%	3.5	3.8	0.4
	MAY-JUL	2.2	2.5	2.7	1688%	2.9	3.2	0.16
Lake Tahoe Rise Gates Closed								
	APR-HIGH	2.2	2.6	2.9	250%	3.2	3.9	1.16
	MAY-HIGH	1	1.48	1.7	239%	1.92	2.4	0.71
Lake Tahoe Net Inflow								
	APR-JUL	280	325	350	347%	375	420	101
	MAY-JUL	205	245	270	574%	300	340	47

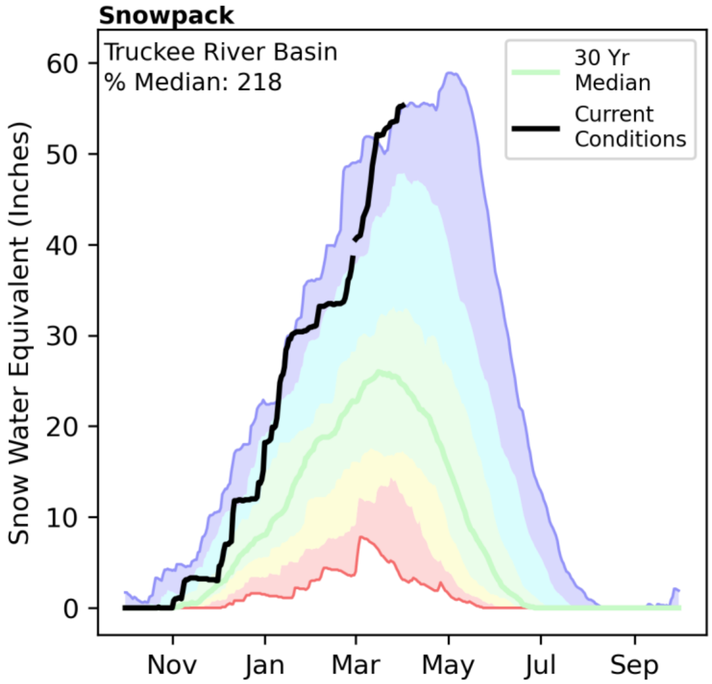
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

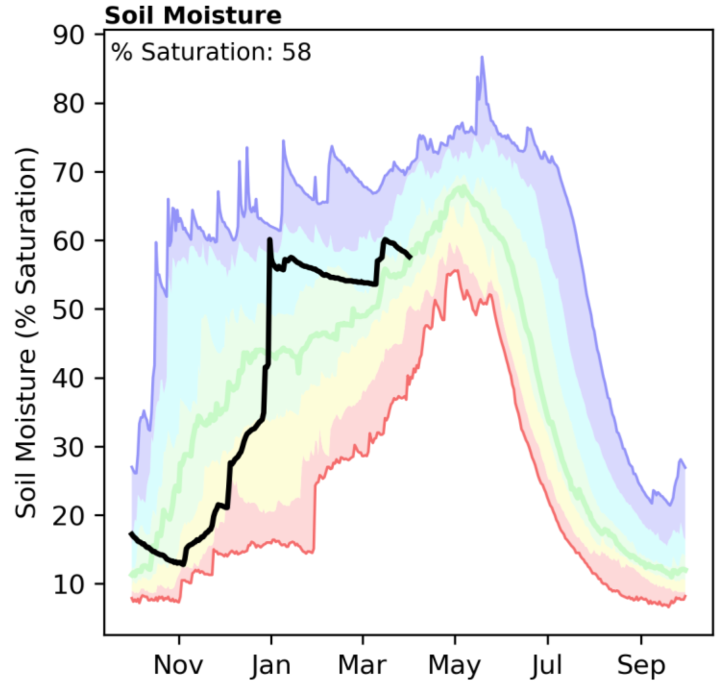
Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Tahoe	290.5	121.4	289.3	744.5
Marlette Lk nr Carson City	10.7	11.1	11.9	11.8

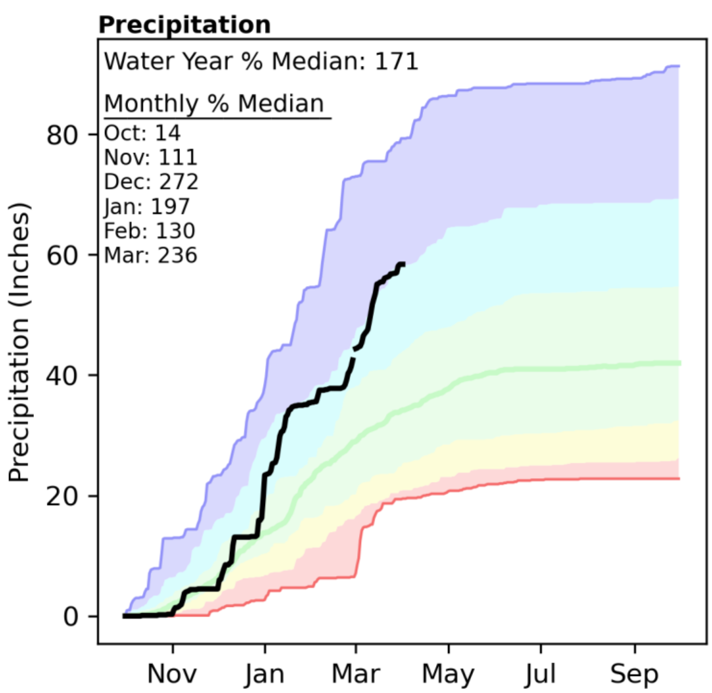
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Lake Tahoe	23	242%	52%

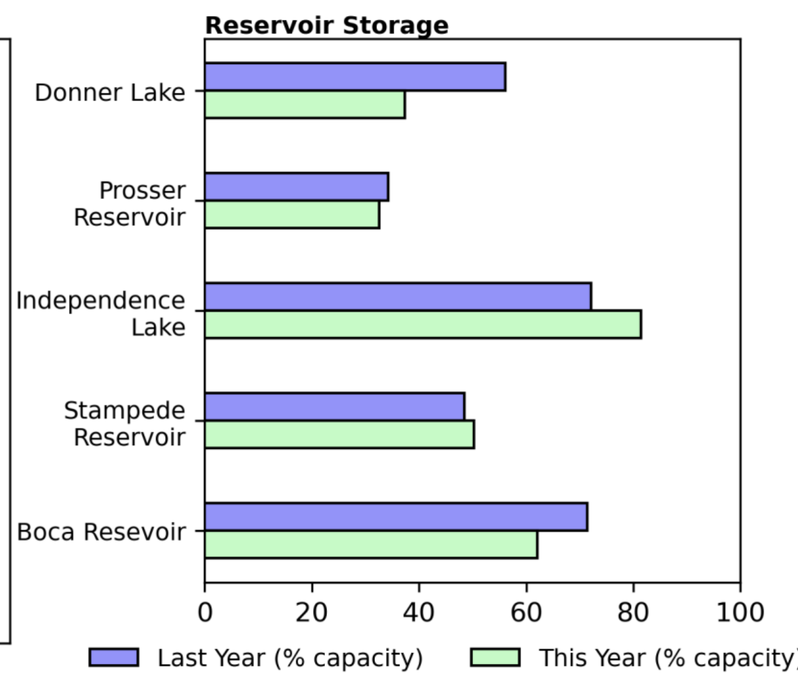
Truckee River Basin | April 1, 2023

Snowpack in the Truckee River Basin is well above normal at 218% of median, compared to 61% at this time last year. Precipitation in March was well above normal at 236%, which brings the seasonal accumulation (October-March) to 171% of median. Soil moisture is at 58% saturation compared to 69% saturation last year. Reservoir storage is 51% of capacity, compared to 52% last year.









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

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Truckee
Streamflow Forecasts - April 1, 2023

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

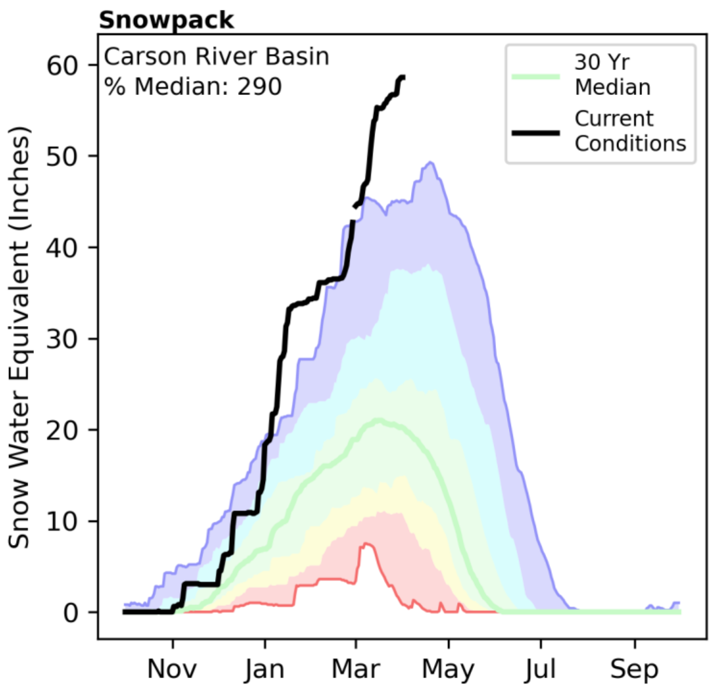
Truckee	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Donner Lake Inflow[2]								
	APR-JUL	26	29	31	207%	33	36	15
	MAY-JUL	12.3	15.2	17.2	210%	19.1	22	8.2
Martis Ck Res Inflow[2]								
	APR-JUL	20	22	24	421%	25	27	5.7
	MAY-JUL	11.2	13.2	14.7	565%	16.1	18.2	2.6
Prosser Ck Res Inflow[2]								
	APR-JUL	76	81	84	240%	87	92	35
	MAY-JUL	53	59	62	282%	66	72	22
Independence Lk Inflow[2]								
	APR-JUL	21	22	23	219%	24	25	10.5
	MAY-JUL	17.4	18.8	19.9	249%	21	22	8
Sagehen Ck nr Truckee								
	APR-JUL	11.8	12.7	13.3	324%	14	14.9	4.1
	MAY-JUL	8.7	9.8	10.5	477%	11.3	12.3	2.2
Stampede Res Local Inflow[2]								
	APR-JUL	159	171	179	303%	187	198	59
	MAY-JUL	110	124	133	369%	143	157	36
L Truckee R ab Boca Reservoir[2]								
	APR-JUL	165	190	200	278%	210	240	72
	MAY-JUL	128	144	155	352%	166	182	44
Boca Res Local Inflow[2]								
	APR-JUL	12.9	14.9	16.4	1079%	17.8	19.8	1.52
	MAY-JUL	3.8	5	5.8	1381%	6.6	7.8	0.42
Truckee R at Farad[2]								
	APR-JUL	490	530	560	249%	600	660	225
	MAY-JUL	365	400	425	306%	450	485	139
Truckee R ab Farad Sidewater[2]								
	APR-JUL	205	220	230	256%	240	255	90
	MAY-JUL	156	170	180	286%	190	205	63
Galena Ck at Galena Ck State Pk								
	APR-JUL	8.8	9.5	10.1	253%	10.6	11.4	4
	MAY-JUL	7.8	8.5	9	281%	9.5	10.3	3.2
Steamboat Ck at Steamboat								
	APR-JUL	17.6	23	27	1286%	31	38	2.1
	MAY-JUL	14.6	18.3	21	1296%	24	29	1.62
Pyramid Lake Elevation Change								
	LOW-HIGH	3.9	4.8	5.5		6.2	7.1	

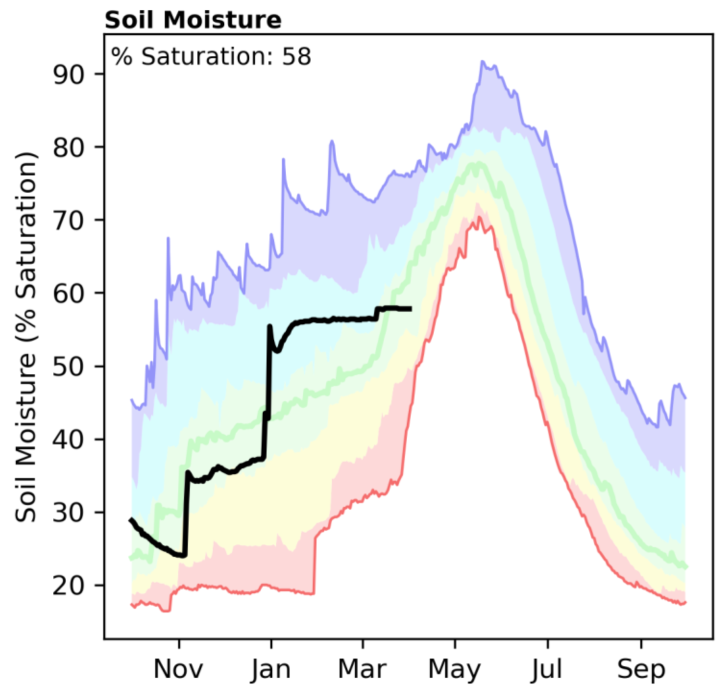
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

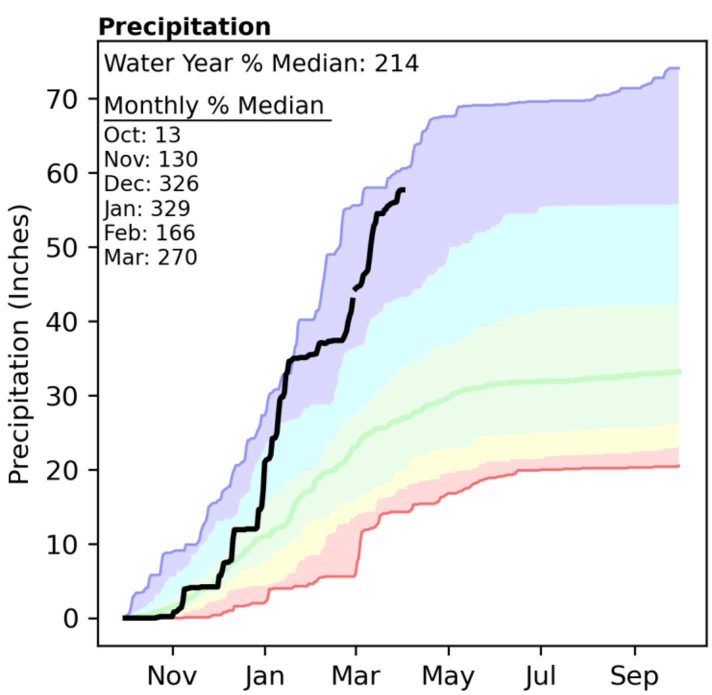
Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Boca Reservoir	25.4	29.2	19.0	40.9
Donner Lake	3.5	5.3	4.3	9.5
Independence Lake	14.1	12.5	14.8	17.3
Prosser Reservoir	9.7	10.2	9.7	29.8
Stampede Reservoir	113.9	109.9	164.2	226.5

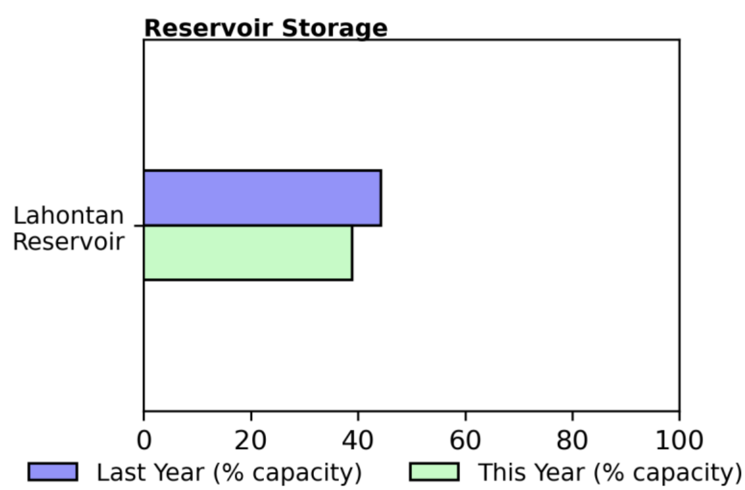
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Truckee	17	218%	61%
Little Truckee ab Stampede	4	220%	71%
Sagehen-Independence	3	226%	76%
Galena	2	212%	73%
Steamboat	2	212%	73%
Truckee above Pyramid Lake	32	237%	55%

Snowpack in the Carson River Basin is well above normal at 290% of median, compared to 51% at this time last year. Precipitation in March was well above normal at 270%, which brings the seasonal accumulation (October-March) to 214% of median. Soil moisture is at 58% saturation compared to 70% saturation last year. Reservoir storage is 39% of capacity, compared to 44% last year.









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

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Carson
Streamflow Forecasts - April 1, 2023

Carson	Forecast Period	Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
EF Carson R nr Gardnerville								
	APR-JUL	490	515	530	323%	545	570	164
	MAY-JUL	410	435	450	388%	470	495	116
	200 cfs	23 Sep	02 Oct	08 Oct		14 Oct	23 Oct	14 Jul
	500 cfs	21 Aug	03 Sep	11 Sep		19 Sep	02 Oct	20 Jun
WF Carson R nr Woodfords								
	APR-JUL	130	137	142	316%	147	154	45
	MAY-JUL	104	113	120	400%	126	136	30
Carson R nr Carson City								
	APR-JUL	510	540	560	421%	585	615	133
	MAY-JUL	410	445	470	485%	495	530	97
Kings Canyon Ck nr Carson City								
	APR-JUL	0.92	1.11	1.25	962%	1.4	1.63	0.13
	MAY-JUL	0.73	0.89	1	1000%	1.12	1.31	0.1
Ash Canyon Ck nr Carson City								
	APR-JUL	2.5	2.8	3	366%	3.2	3.6	0.82
	MAY-JUL	2	2.3	2.5	410%	2.7	3	0.61
Carson R at Ft Churchill								
	APR-JUL	520	550	570	435%	590	660	131
	MAY-JUL	405	440	460	484%	485	520	95

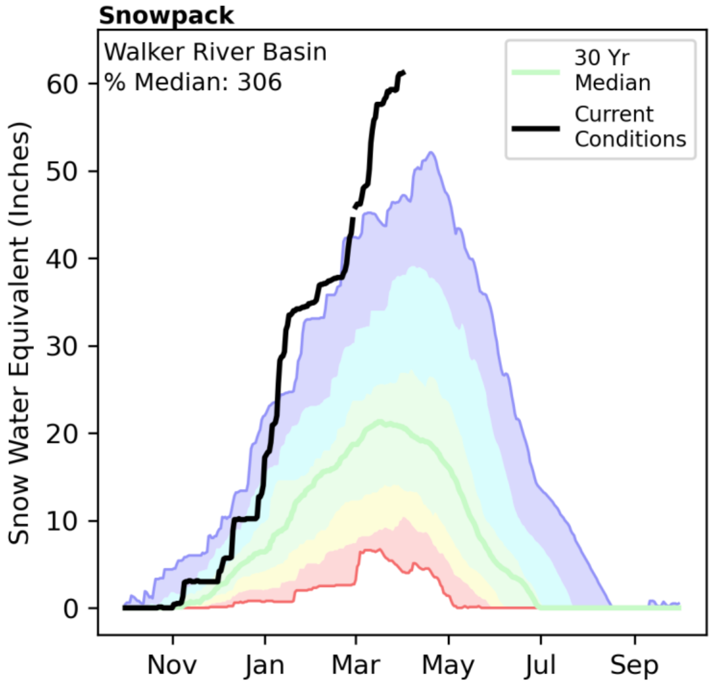
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

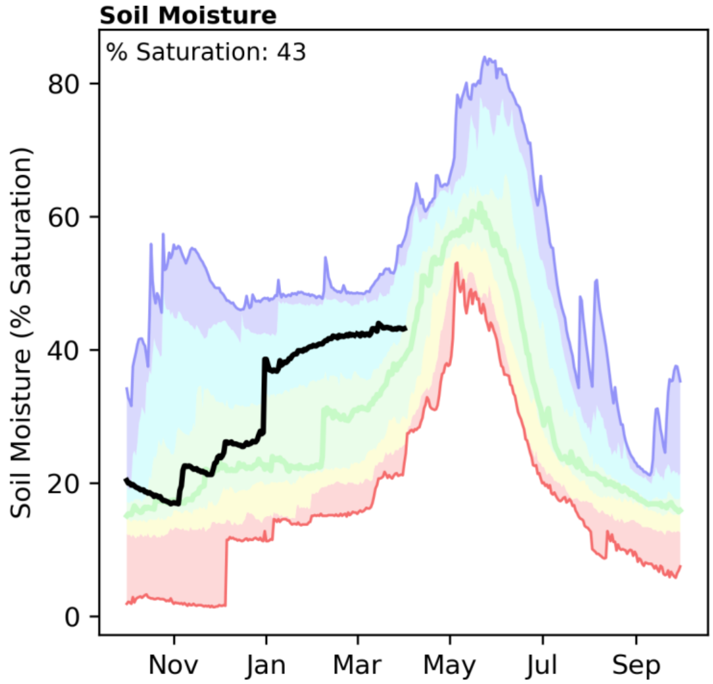
Reservoir Storage **End of March, 2023**	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lahontan Reservoir	121.6	138.7	198.4	313.0

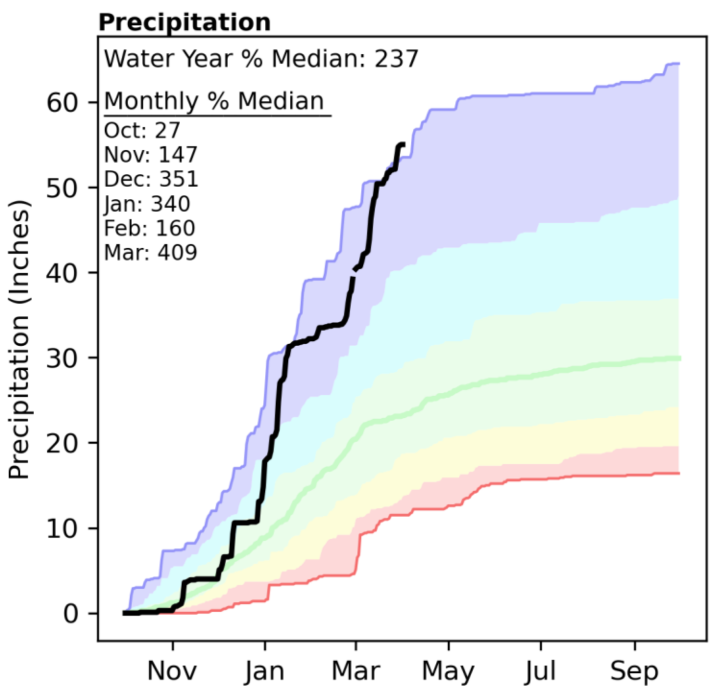
Watershed Snowpack Analysis **April 1, 2023**	# of Sites	% Median	Last Year % Median
Carson	16	290%	51%
East Fork Carson	7	300%	55%
West Fork Carson	9	269%	47%

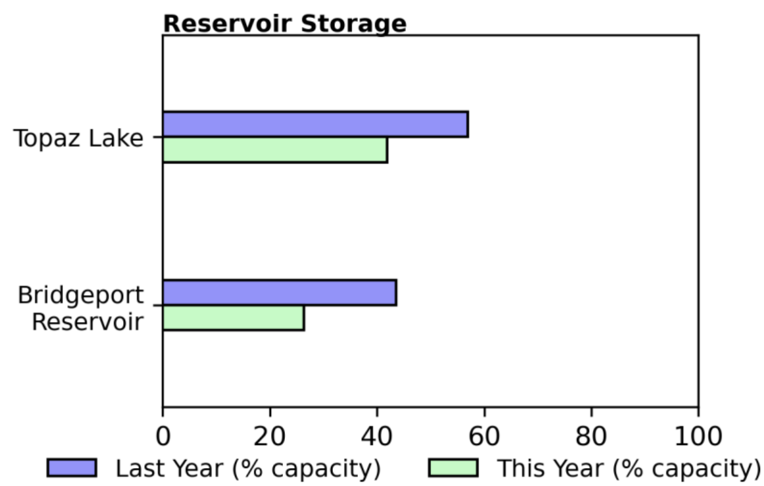
Walker River Basin | April 1, 2023

Snowpack in the Walker River Basin is well above normal at 306% of median, compared to 61% at this time last year. Precipitation in March was well above normal at 409%, which brings the seasonal accumulation (October-March) to 237% of median. Soil moisture is at 43% saturation compared to 57% saturation last year. Reservoir storage is 35% of capacity, compared to 51% last year.









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

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Walker

Streamflow Forecasts - April 1, 2023

Walker	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
		Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast						
E Walker R nr Bridgeport[2]								
	APR-AUG	205	220	230	523%	240	255	44
	MAY-AUG	194	205	215	524%	225	240	41
W Walker R bl L Walker R nr Coleville								
	APR-JUL	380	400	415	271%	430	450	153
	MAY-JUL	365	385	400	317%	410	430	126
W Walker R nr Coleville								
	APR-JUL	385	405	415	282%	430	445	147
	MAY-JUL	350	370	380	311%	395	415	122
Walker Lake Elevation Change[1]								
	LOW-HIGH	6.5	8	9		10	11.5	

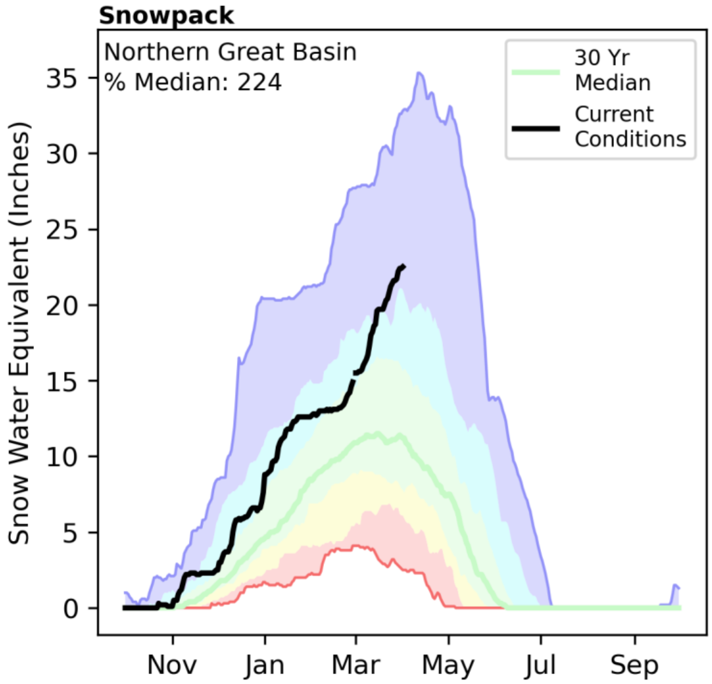
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

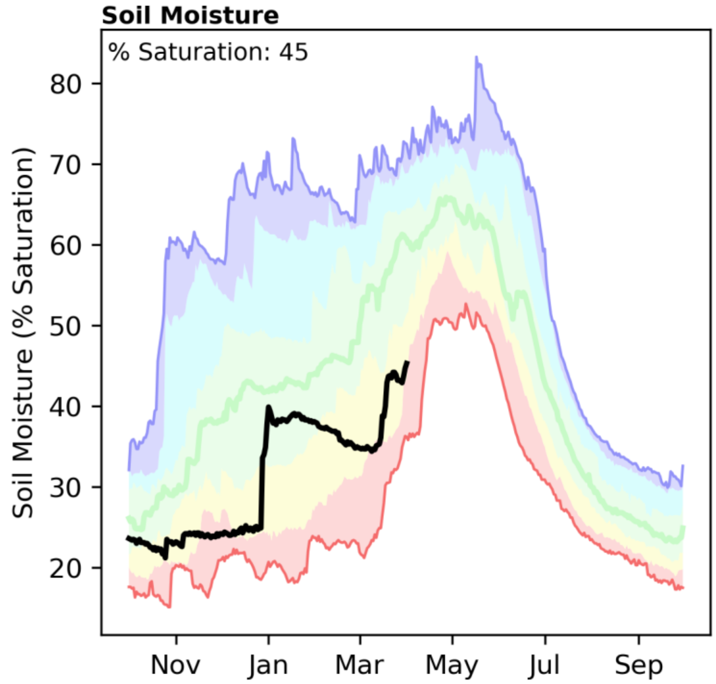
Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Bridgeport Reservoir	11.2	18.5	25.1	42.5
Topaz Lk nr Topaz	24.9	33.8	24.2	59.4

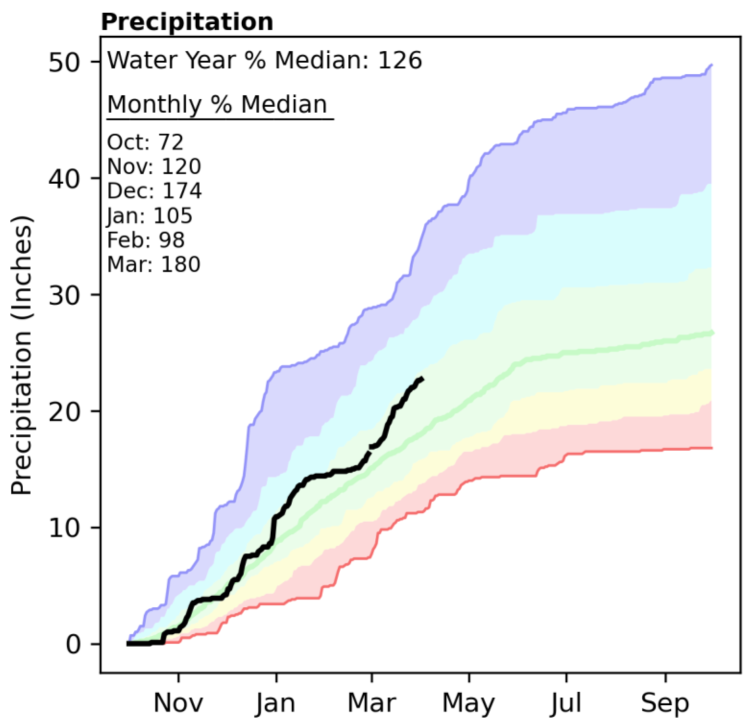
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Walker	10	306%	61%
East Walker ab Bridgeport	4	361%	57%
West Walker ab Coleville	8	301%	60%

Northern Great Basin | April 1, 2023

Snowpack in the Northern Great Basin is well above normal at 224% of median, compared to 53% at this time last year. Precipitation in March was well above normal at 180%, which brings the seasonal accumulation (October-March) to 126% of median. Soil moisture is at 45% 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

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Northern Great Basin
Streamflow Forecasts - April 1, 2023

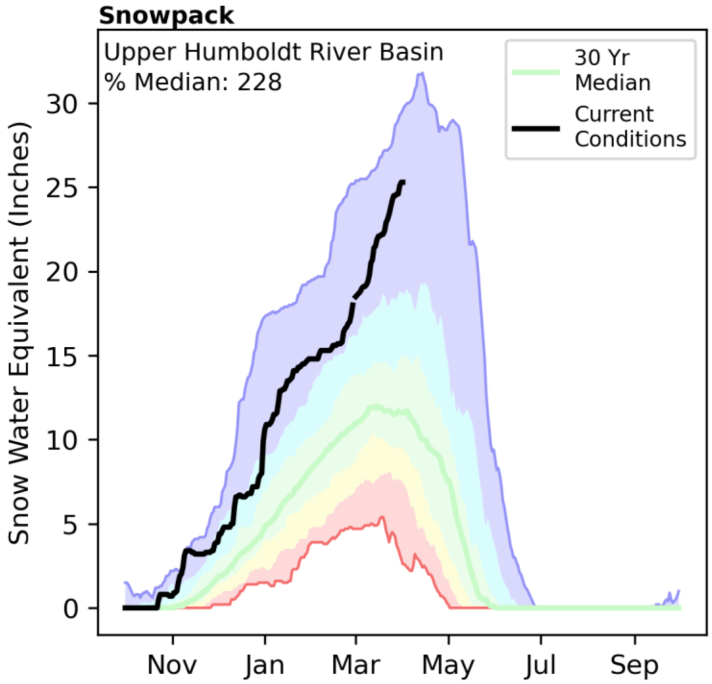
Northern Great Basin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
		Forecast Exceedance Probabilities For Risk Assessment. Chance that actual volume will exceed forecast						
McDermitt Ck nr McDermitt	APR-JUL	23	27	30	411%	33	38	7.3

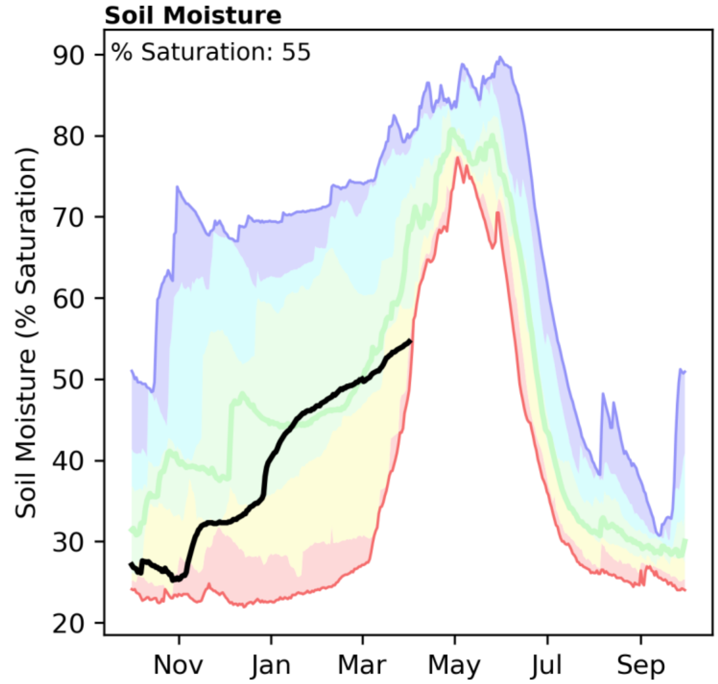
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

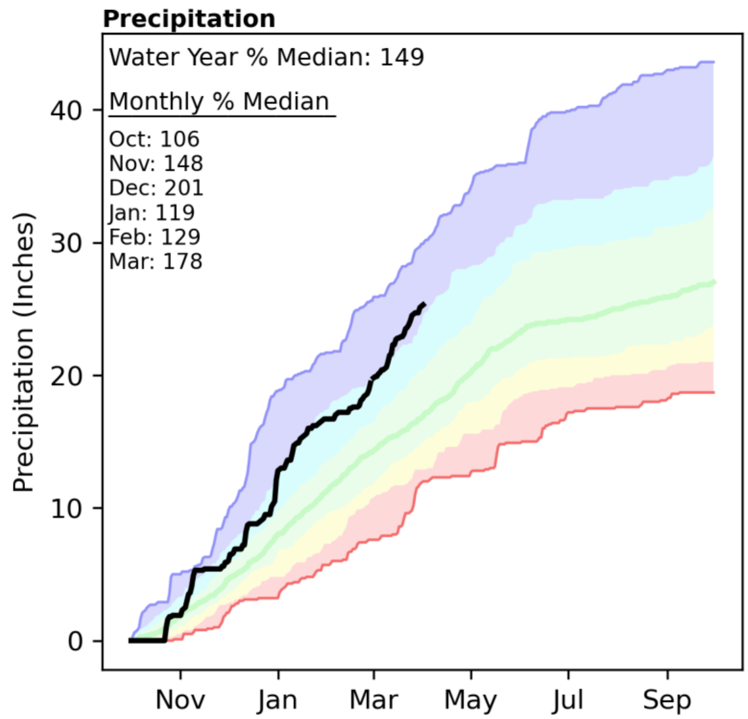
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Northern Great Basin	15	224%	53%
Surprise Valley-Warner Mtns	4	189%	60%
McDermitt	4	227%	38%
Quinn	8	233%	45%

Upper Humboldt River Basin | April 1, 2023

Snowpack in the Upper Humboldt River Basin is well above normal at 228% of median, compared to 50% at this time last year. Precipitation in March was well above normal at 178%, which brings the seasonal accumulation (October-March) to 149% of median. Soil moisture is at 55% saturation compared to 73% saturation last year.







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

Data Current As of: 4/7/2023 12:21:27 PM

Upper Humboldt
Streamflow Forecasts - April 1, 2023

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

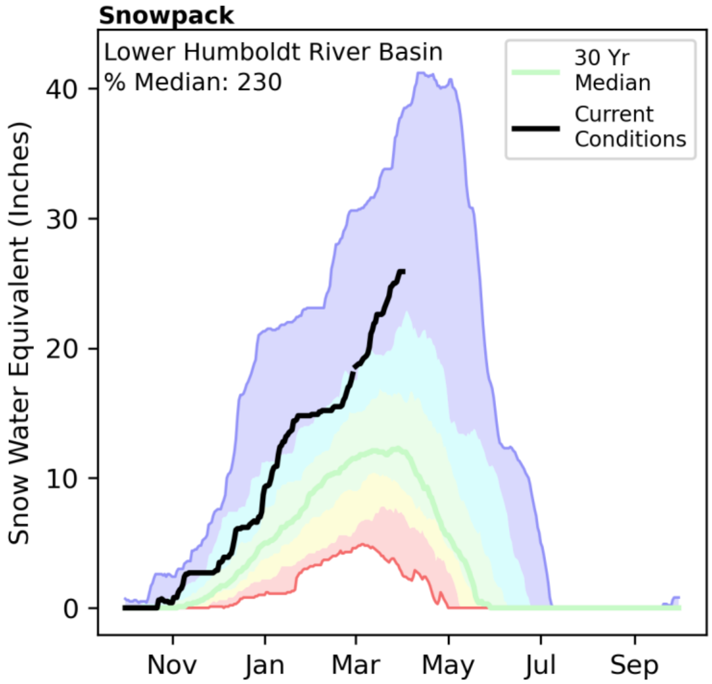
Upper Humboldt	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Marys R nr Deeth								
	APR-JUL	52	60	65	250%	70	78	26
	MAY-JUL	40	47	52	277%	57	64	18.8
Lamoille Ck nr Lamoille								
	APR-JUL	45	51	55	212%	59	65	26
	MAY-JUL	42	48	52	208%	56	62	25
NF Humboldt R at Devils Gate								
	APR-JUL	75	87	95	528%	103	115	18
	MAY-JUL	60	69	75	581%	81	90	12.9
Humboldt R nr Elko								
	APR-JUL	220	260	290	420%	320	360	69
	MAY-JUL	184	225	250	417%	275	315	60
SF Humboldt R abv Tenmile Ck								
	APR-JUL	157	176	190	365%	205	225	52
	MAY-JUL	123	142	155	337%	168	187	46
SF Humboldt R ab Dixie Ck								
	APR-JUL	148	170	185	363%	200	220	51
	MAY-JUL	124	146	160	348%	174	196	46
Humboldt R nr Carlin								
	APR-JUL	325	395	450	450%	505	595	100
	MAY-JUL	255	325	375	441%	430	520	85
Humboldt R at Palisade								
	APR-JUL	360	440	500	459%	565	660	109
	MAY-JUL	270	345	400	455%	460	555	88

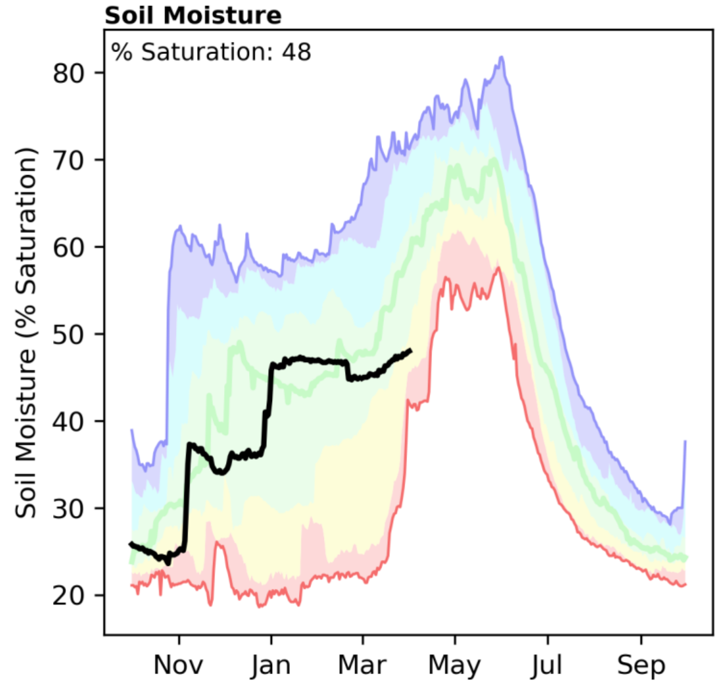
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

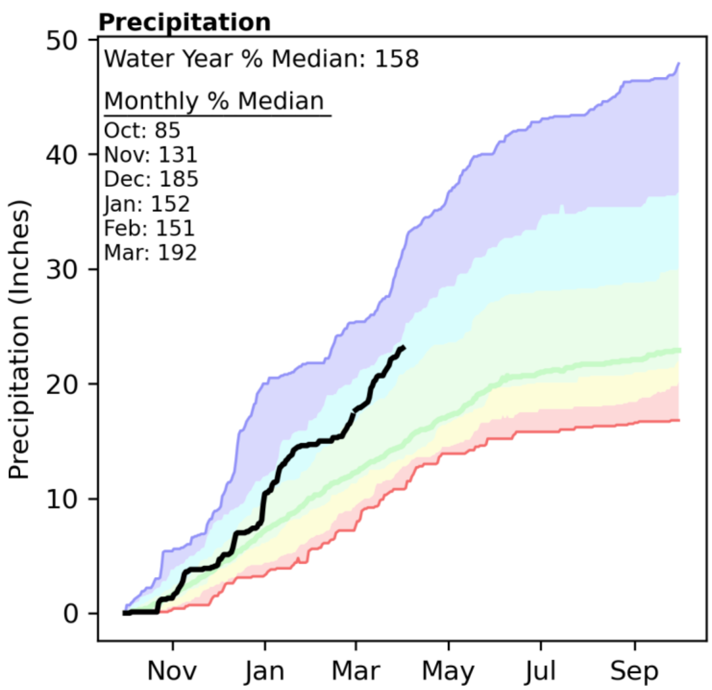
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Upper Humboldt	26	228%	50%
Mary's	5	208%	54%
Lamoille	3	209%	53%
North Fork Humboldt	6	323%	36%
South Fork Humboldt	8	235%	52%

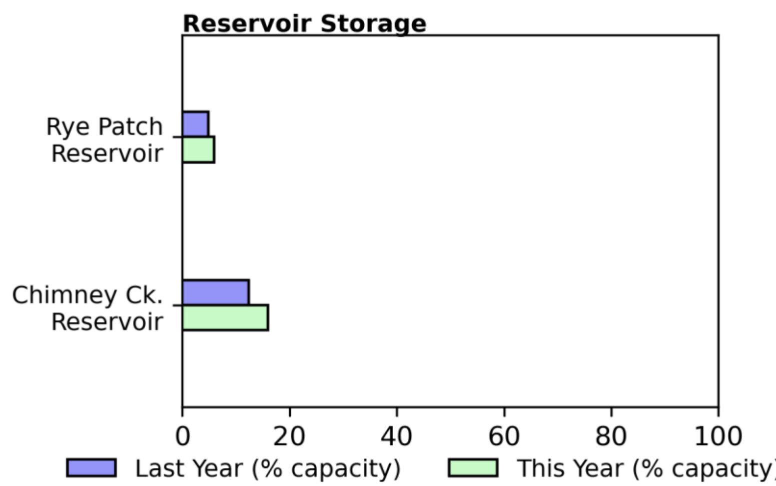
Lower Humboldt River Basin | April 1, 2023

Snowpack in the Lower Humboldt River Basin is well above normal at 230% of median, compared to 63% at this time last year. Precipitation in March was well above normal at 192%, which brings the seasonal accumulation (October-March) to 158% of median. Soil moisture is at 48% saturation compared to 68% saturation last year. Reservoir storage is 8% 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

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Lower Humboldt
Streamflow Forecasts - April 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	37	50	60	984%	71	89	6.1
	MAY-JUL	14.8	23	30	1071%	38	51	2.8
Humboldt R at Comus								
	APR-JUL	320	395	450	570%	510	600	79
	MAY-JUL	250	320	375	615%	430	525	61
L Humboldt R nr Paradise Valley[2]								
	APR-JUL	19	23	25	431%	27	31	5.8
	MAY-JUL	9.8	12.9	15	536%	17.1	20	2.8
Martin Ck nr Paradise Valley								
	APR-JUL	29	34	37	343%	40	45	10.8
	MAY-JUL	18.8	23	27	397%	30	34	6.8
Humboldt R nr Imlay								
	APR-JUL	270	345	400	769%	460	555	52
	MAY-JUL	230	300	350	1061%	405	495	33

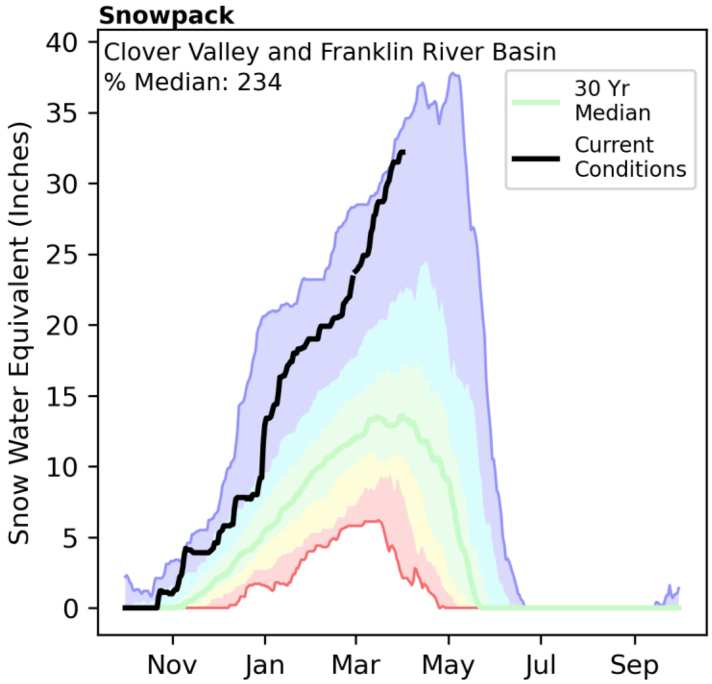
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

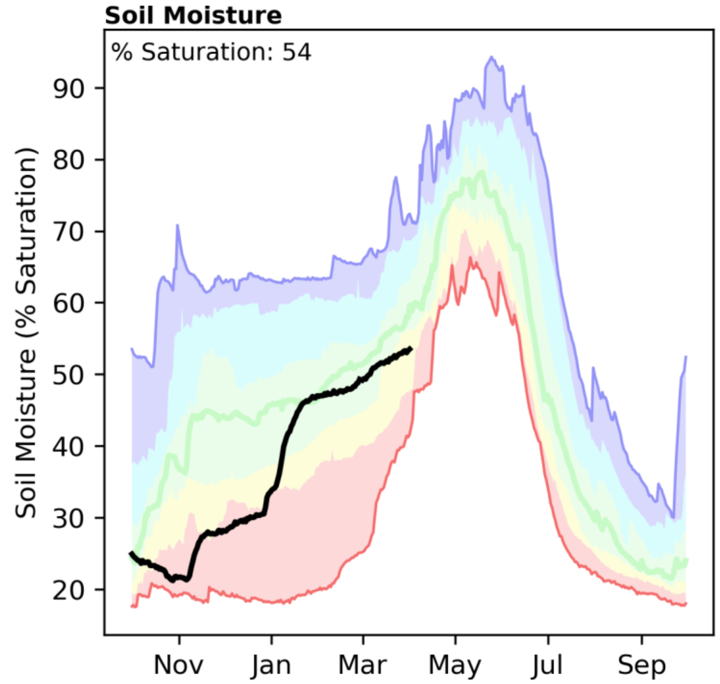
Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Chimney Creek Reservoir	5.6	4.3	8.4	35.0
Rye Patch Re nr Rye Patch, NV	11.6	9.5	53.5	194.3

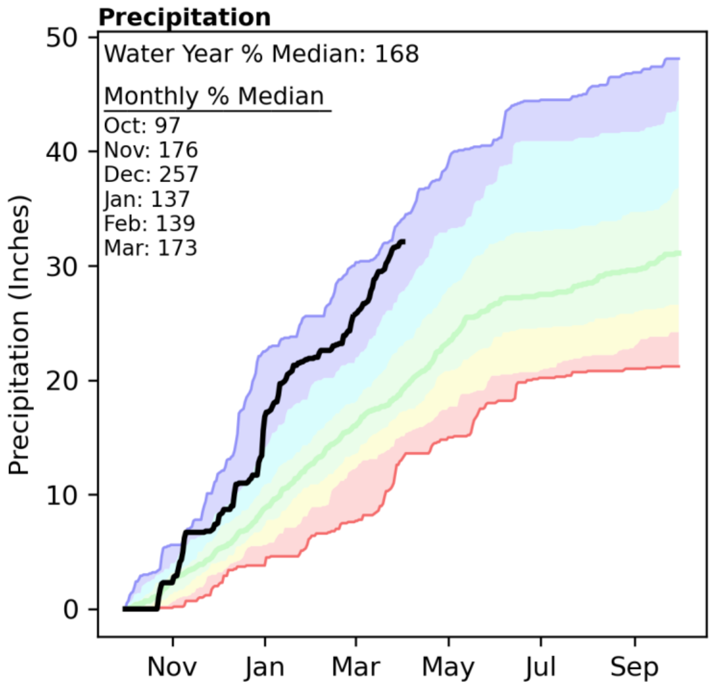
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Lower Humboldt	9	230%	63%
Rock	2	276%	81%
Reese	3	254%	59%
Martin	2	192%	63%
Little Humboldt	5	234%	61%
Humboldt above Imlay	35	228%	53%

Clover Valley and Franklin River Basin | April 1, 2023

Snowpack in the Clover Valley and Franklin River Basin is well above normal at 234% of median, compared to 52% at this time last year. Precipitation in March was well above normal at 173%, which brings the seasonal accumulation (October-March) to 168% of median. Soil moisture is at 54% saturation compared to 64% 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

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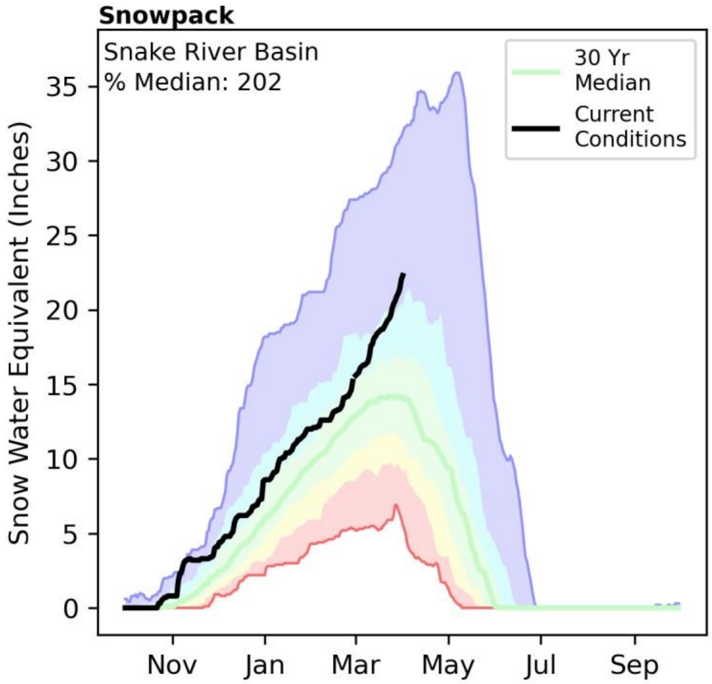
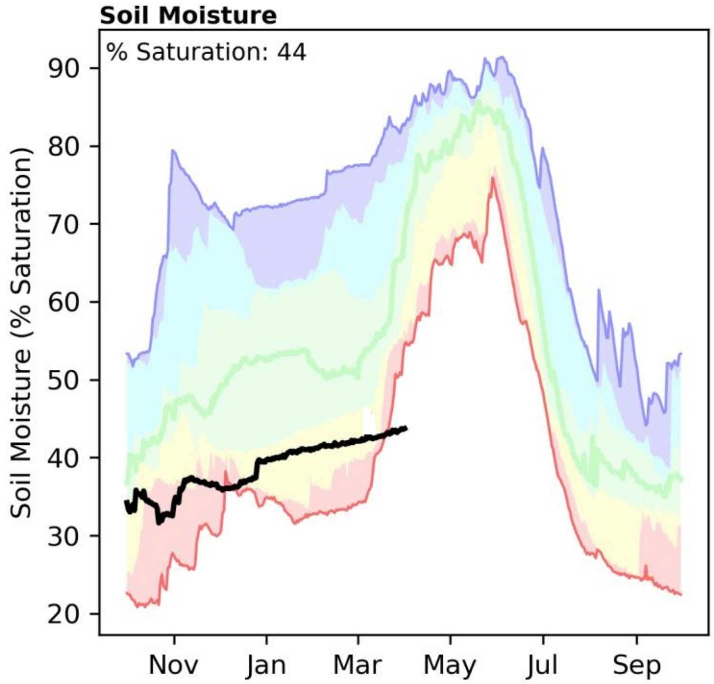
Clover Valley And Franklin - April 1, 2023

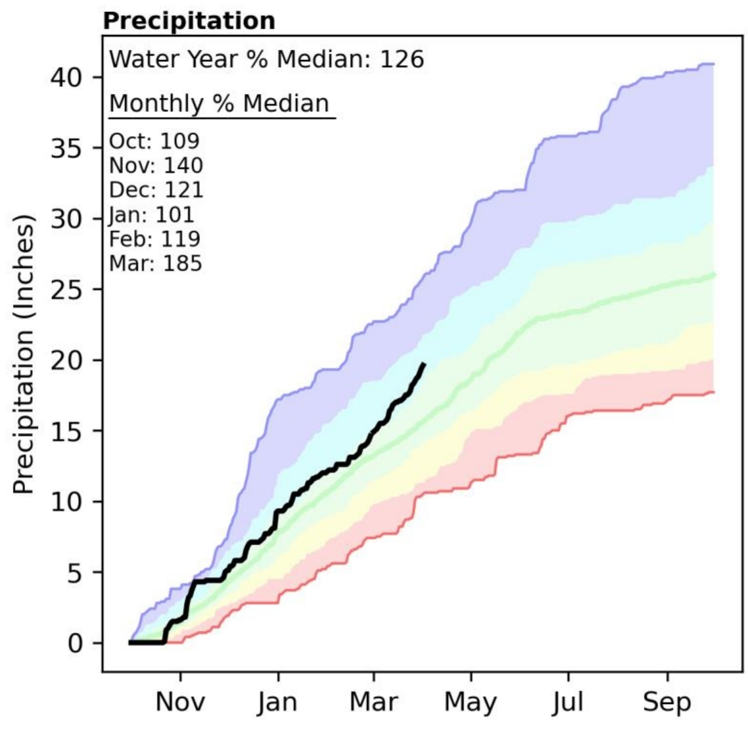
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Clover Valley and Franklin	11	234%	52%
Clover Valley	5	255%	40%
Franklin	7	218%	54%

Snake River Basin | April 1, 2023

Snowpack in the Snake River Basin is well above normal at 202% of median, compared to 66% at this time last year. Precipitation in March was well above normal at 185%, which brings the seasonal accumulation (October-March) to 126% of median. Soil moisture is at 44% saturation compared to 73% saturation last year.







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

Data Current As of: 4/7/2023 12:21:30 PM

Snake
Streamflow Forecasts - April 1, 2023

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

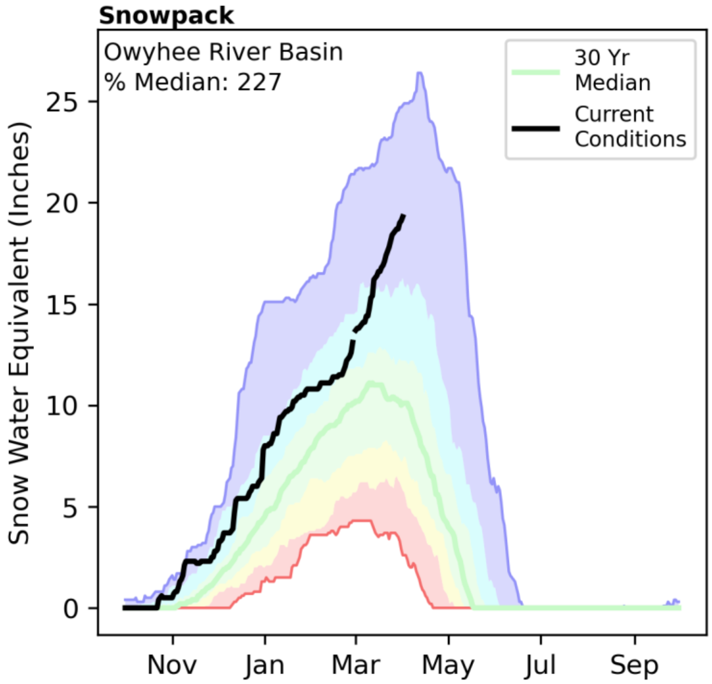
Snake	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Bruneau R at Rowland								
	APR-JUL	65	79	88	183%	97	110	48
	APR-SEP	67	81	90	184%	99	113	49
Jarbidge River Below Jarbidge								
	APR-JUL	24	28	30	153%	33	36	19.6
	APR-SEP	25	28	31	155%	33	37	20
Salmon Falls Ck nr San Jacinto								
	APR-JUL	100	121	137	245%	153	178	56
	APR-SEP	104	125	140	241%	157	182	58

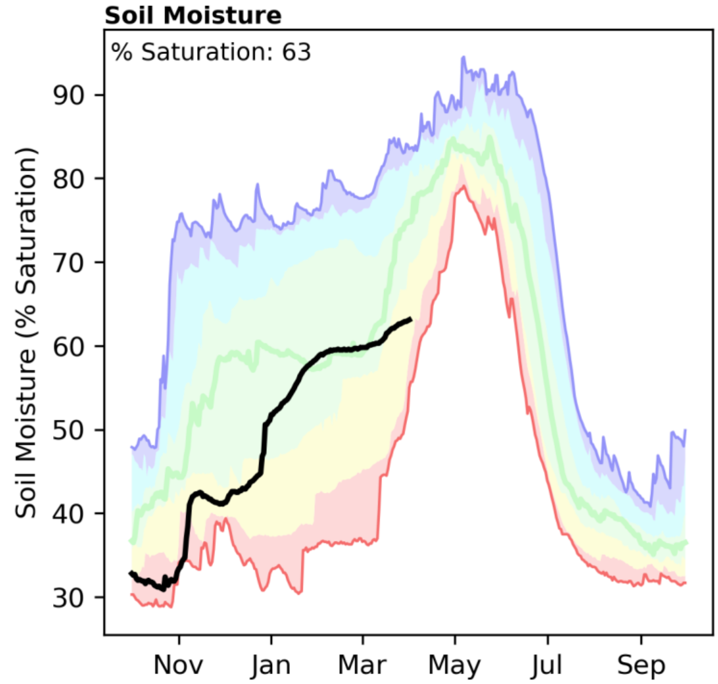
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

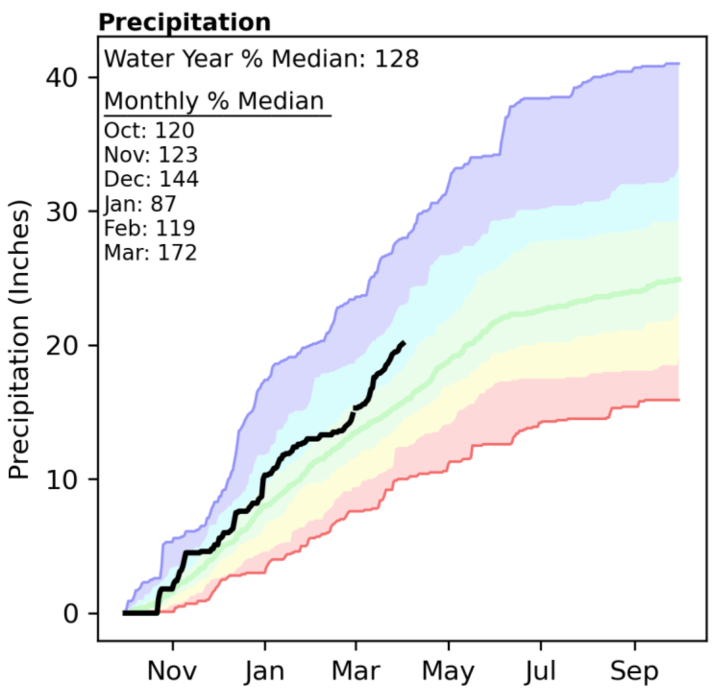
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Snake	14	202%	66%
Bruneau Headwaters	6	213%	49%
Jarbidge	3	147%	71%
Salmon Falls	7	199%	77%

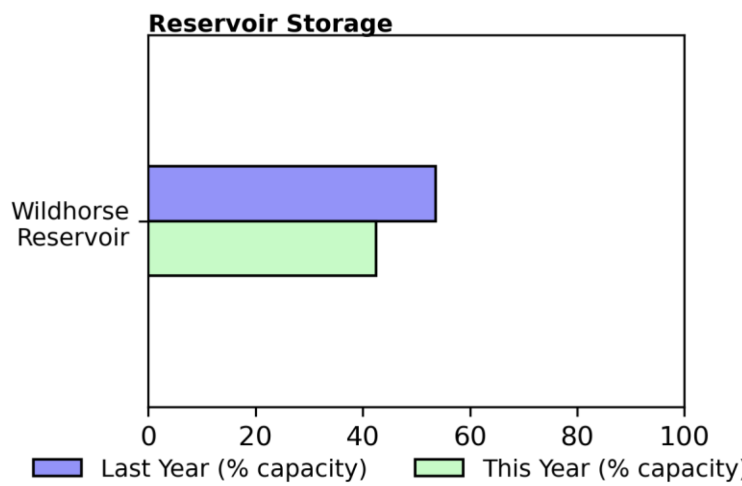
Owyhee River Basin | April 1, 2023

Snowpack in the Owyhee River Basin is well above normal at 227% of median, compared to 51% at this time last year. Precipitation in March was well above normal at 172%, which brings the seasonal accumulation (October-March) to 128% of median. Soil moisture is at 63% saturation compared to 79% saturation last year. Reservoir storage is 42% of capacity, compared to 54% last year.









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

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Owyhee
Streamflow Forecasts - April 1, 2023

Owyhee	Forecast Period	Forecast Exceedance Probabilities For Risk Assessment — Chance that actual volume will exceed forecast: 90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Owyhee R nr Gold Ck[2]	APR-JUL	22	31	37	215%	44	56	17.2

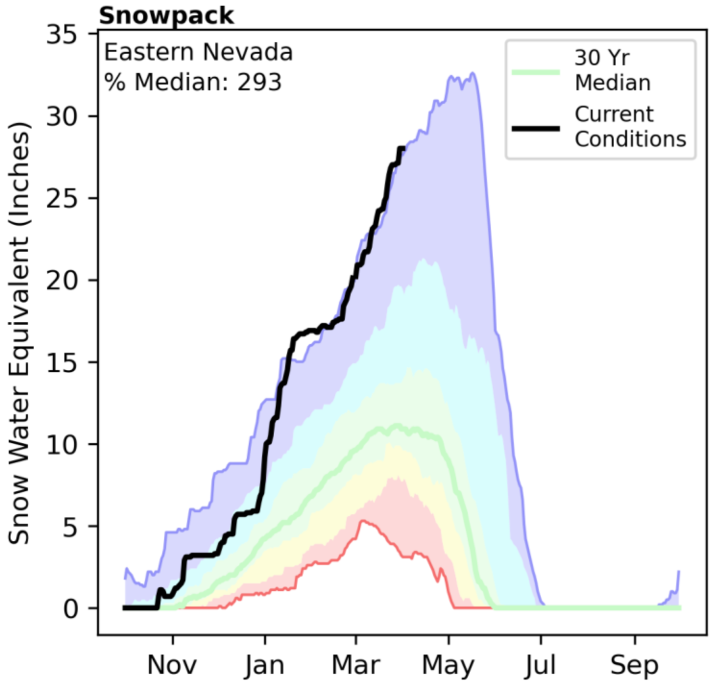
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

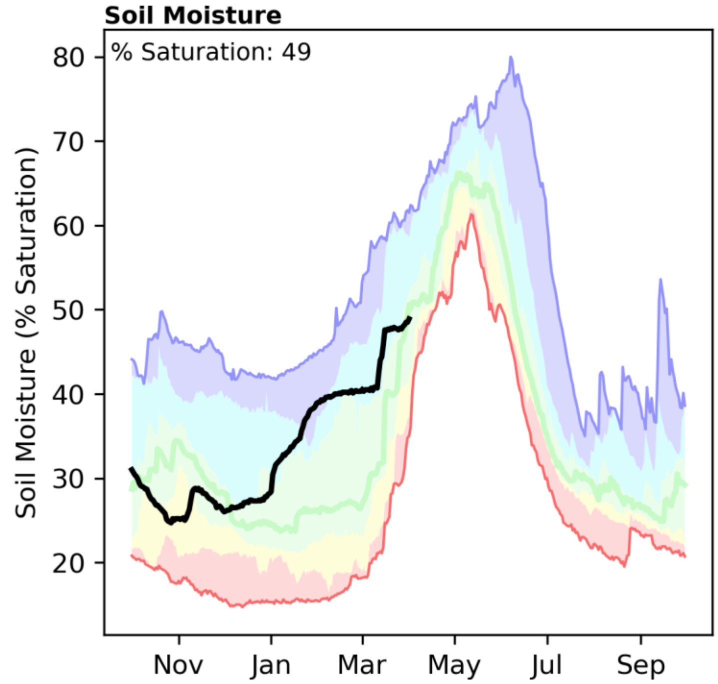
Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Wild Horse Reservoir	30.4	38.3	33.3	71.5

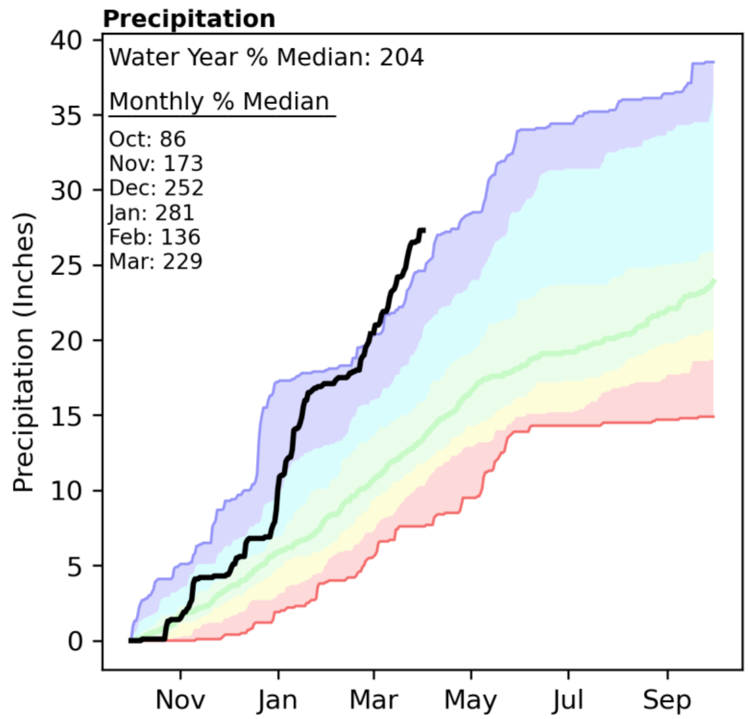
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Owyhee	12	227%	51%
Owyhee ab Owhyee	8	204%	44%
Owhyee ab Gold Creek	4	195%	35%
South Fork Owyhee	7	212%	55%

Eastern Nevada | April 1, 2023

Snowpack in Eastern Nevada is well above normal at 293% of median, compared to 64% at this time last year. Precipitation in March was well above normal at 229%, which brings the seasonal accumulation (October-March) to 204% of median. Soil moisture is at 49% saturation compared to 52% saturation last year.







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

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Eastern Nevada
Streamflow Forecasts - April 1, 2023

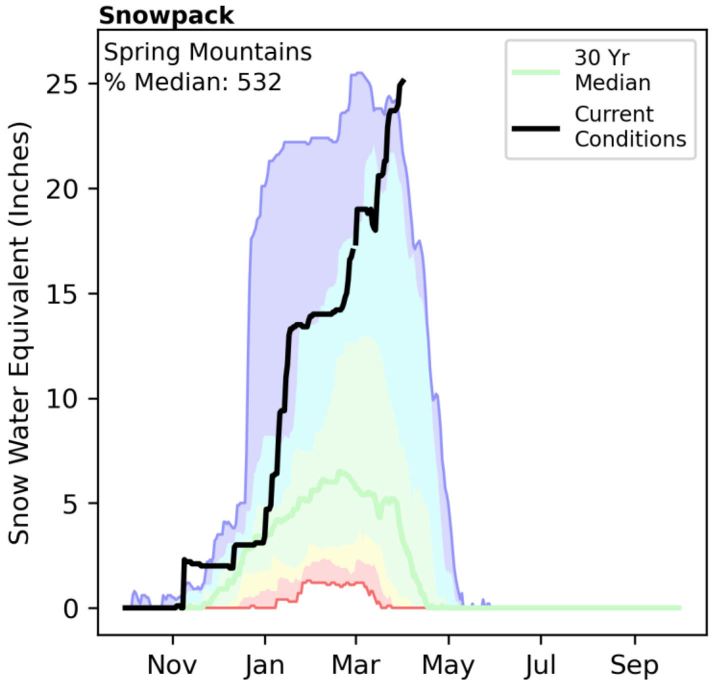
Eastern Nevada	Forecast Period	Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Kingston Ck nr Austin	APR-JUL	6.7	8.2	9.3	522%	10.5	12.3	1.78
Steptoe Ck nr Ely	APR-JUL	7.6	8.7	9.4	691%	10.2	11.3	1.36
Cleve Ck nr Ely	APR-JUL	8.1	9.7	10.9	404%	12.1	14	2.7
Lehman Ck nr Baker	APR-JUL	5.3	6.1	6.6	332%	7.1	7.9	1.99

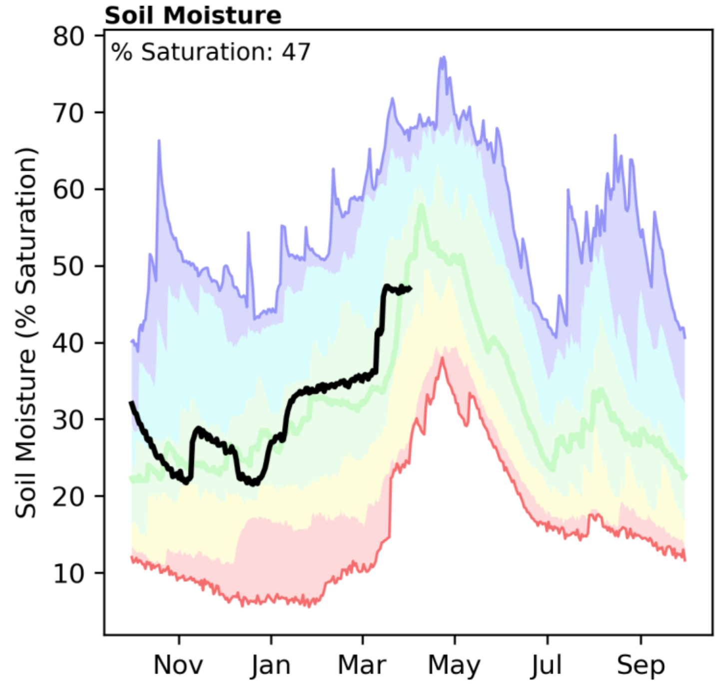
1) 90% And 10% exceedance probabilities are actually 95% And 5%
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

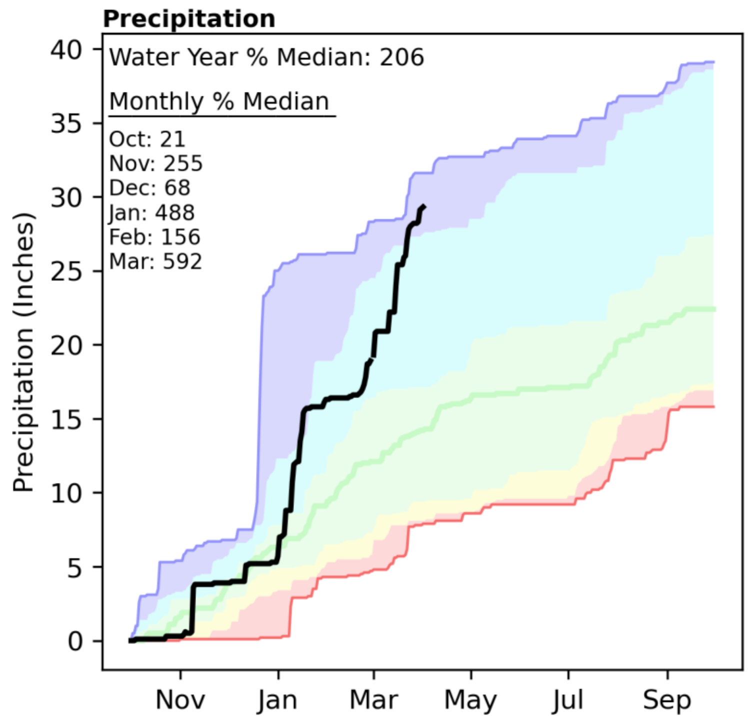
Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Eastern Nevada	15	293%	64%
Kingston	2	238%	59%
Steptoe Valley	5	275%	68%

Spring Mountains | April 1, 2023

Snowpack in the Spring Mountains is well above normal at 532% of median, compared to 49% at this time last year. Precipitation in March was well above normal at 592%, which brings the seasonal accumulation (October-March) to 206% of median. Soil moisture is at 47% saturation compared to 54% saturation last year.





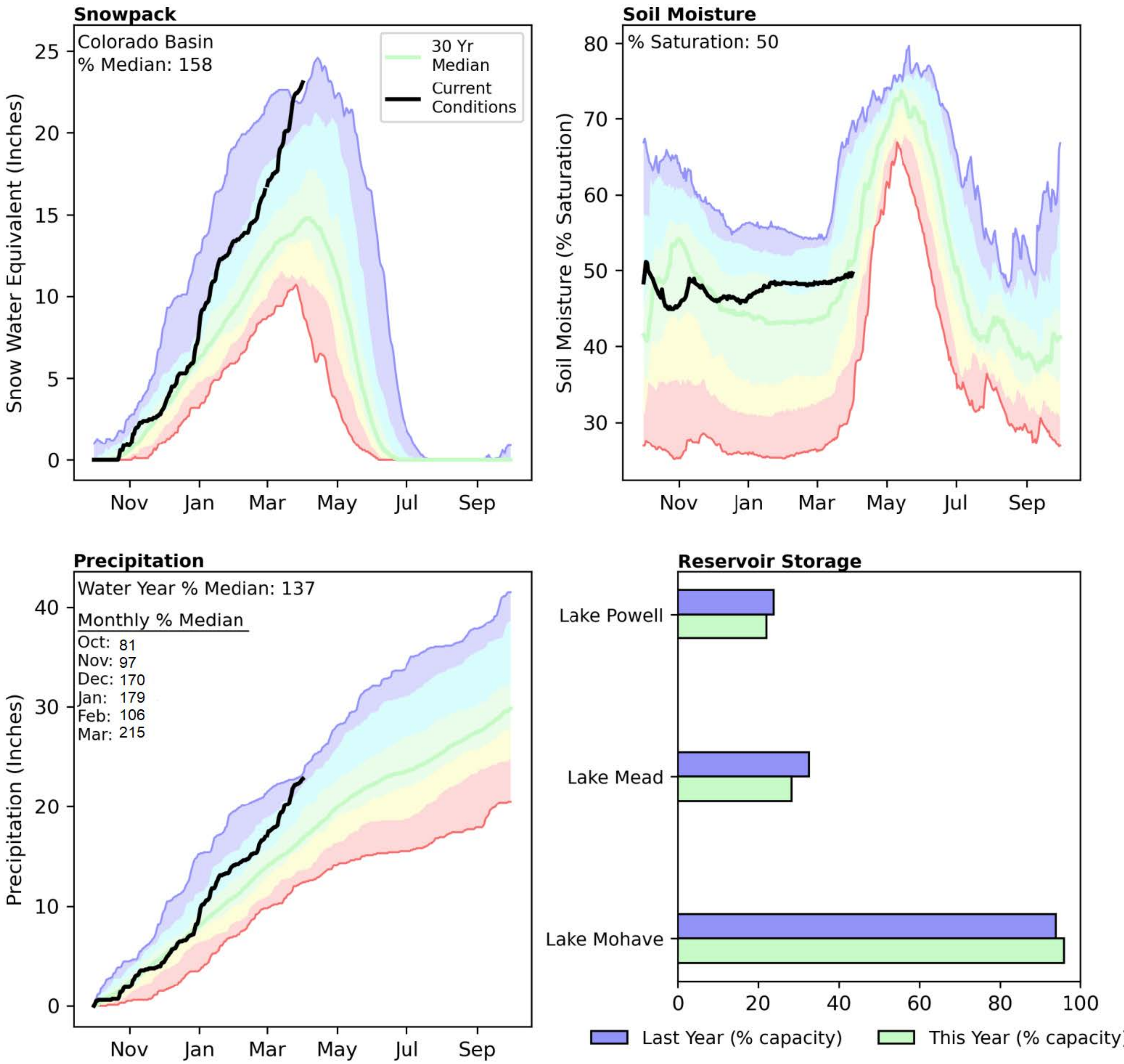


Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th percentiles.
For more information visit: 30 year normal calculation description

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 | April 1, 2023

Snowpack in the Colorado Basin above Lake Powell is well above normal at 158% of median, compared to 89% at this time last year. Precipitation in March was well below normal at 215%, which brings the seasonal accumulation (October-March) to 137% of median. Soil moisture is at 50% saturation compared to 58% saturation last year. Reservoir storage in the Lower Colorado Basin is 27% of capacity, compared to 30% last year.



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

Data Current As of: 4/7/2023 12:21:35 PM

Colorado
Streamflow Forecasts - April 1, 2023

Colorado	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
		Forecast Exceedance Probabilities For Risk Assessment Chance that actual volume will exceed forecast						
Lake Powell Inflow [2]	APR-JUL	8000	9620	10800	176%	12000	14000	6130
Virgin R at Littlefield	APR-JUL	151	176	194	588%	215	245	33
Virgin R nr Hurricane	APR-JUL	140	163	180	581%	198	225	31

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

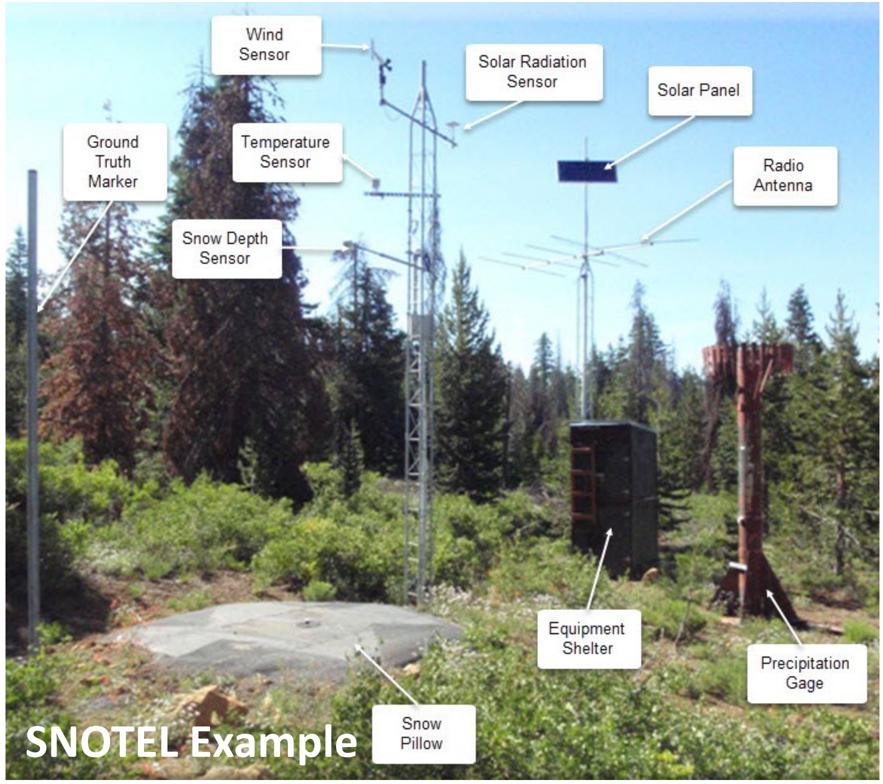
Reservoir Storage End of March, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Powell	5375.0	5812.4	12880.0	24322.0
Lake Mead	7401.7	8536.0	15296.0	26159.0
Lake Mohave	1734.0	1696.0	1684.0	1810.0

Watershed Snowpack Analysis April 1, 2023	# of Sites	% Median	Last Year % Median
Virgin	9	339%	69%
Upper Colorado	130	158%	89%

Appendix - SNOTEL and Snow Course Overview

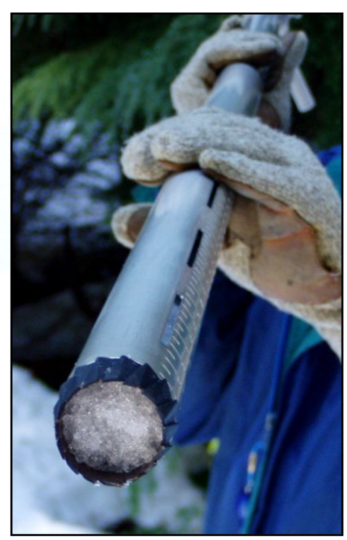
SNOTEL

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.

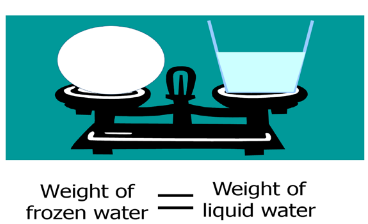


Snow core inside snow tubes

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.



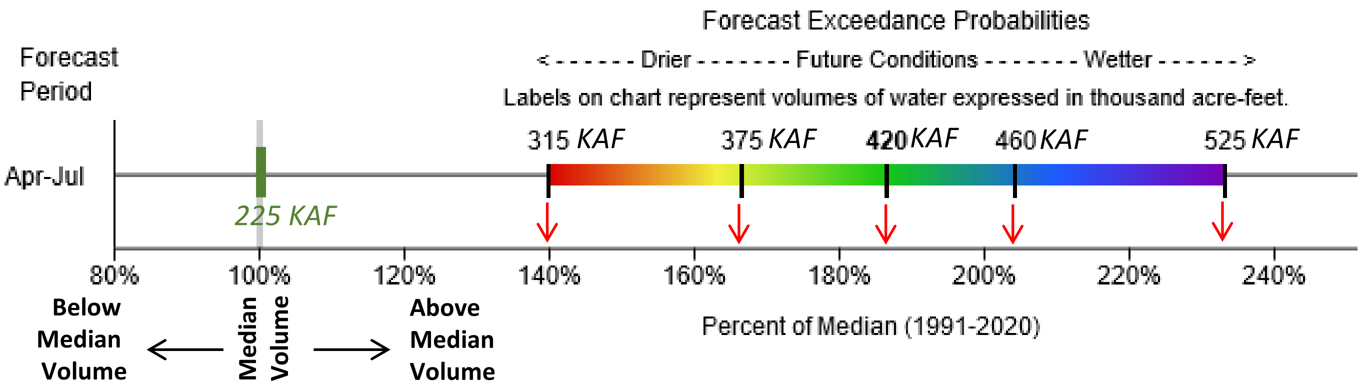
Appendix: Interpreting the Streamflow Forecast Chart

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

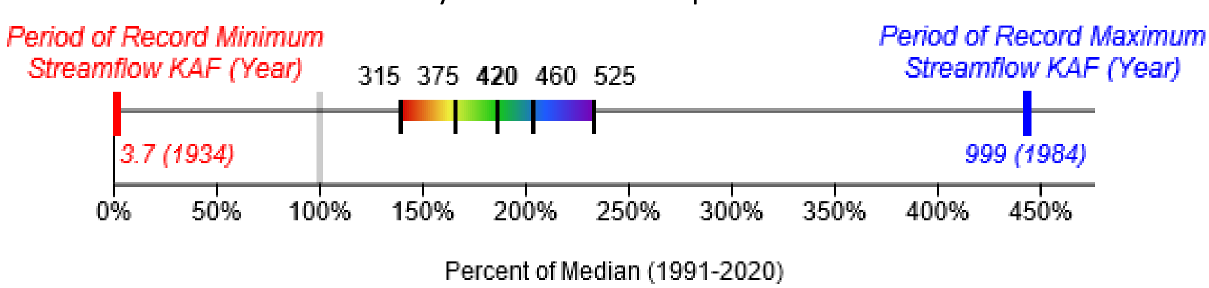
The Forecast Chart (below) provides an alternative to the tables (above) used in the basin summaries. The chart displays the forecast exceedance range as a colored bar. The vertical lines on the bar signify the five forecast exceedances.

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.

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/