

California Water Supply Outlook Report

May 2023



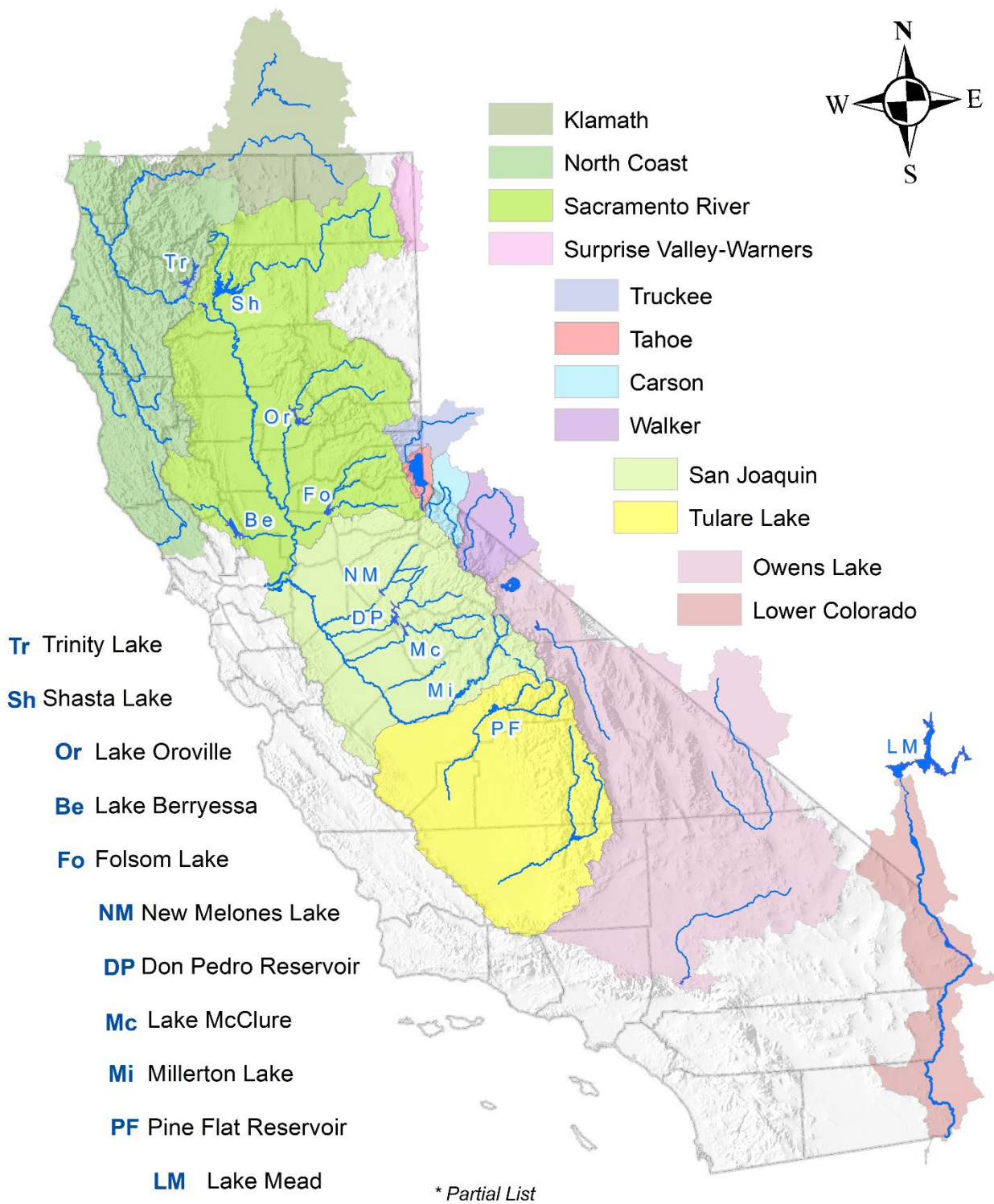
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Contents

California Forecast Basins, Major Rivers, and Large Reservoirs (Map).....	3
State of California General Outlook	4
Streamflow Forecasts:	
Sacramento River Basin	5
San Joaquin River Basin	6
Tulare Lake Basin	7
Owens Lake Basin.....	8
North Coastal Area Basin	9
Klamath Basin	10
Lake Tahoe Basin	12
Truckee River Basin	14
Carson River Basin	16
Walker River Basin	18
Surprise Valley-Warner Mtns	20
Lower Colorado River Basin	22
How Forecasts are Made	23

Cover: West Walker River watershed (April 21, 2023)

California Forecast Basins, Major Rivers, and Large Reservoirs*



STATE OF CALIFORNIA GENERAL OUTLOOK

May 2023

1991-2020 MEDIANS

On October 1, 2021 the NRCS updated its 30-year normals period, shifting it from 1981-2010 to 1991-2020. The normals available from the National Water and Climate Center (NWCC) include the median and average for Snow Water Equivalent (SWE), snow depth (snow courses only), precipitation, volumetric streamflow, and reservoir storage. Values are calculated from data collected by NRCS-managed stations and external agencies such as the U.S. Geological Survey (USGS), National Weather Service (NWS), state agencies, and private organizations. Normals are calculated for various durations including daily, month-to-date, semi-monthly, monthly, seasonal, and annual based on the data type.

The 1991-2020 normals update may have shifted the reported median values compared to those in previous reports for one or both of the following reasons: 1) the underlying data used to compute the statistics are not the same between the two 30-year periods; and 2) Calculation methods for 1991-2020 have also been updated. Therefore, caution is recommended when making inferences from comparisons between the 1991-2020, 1981-2010, and 1971-2000 normals. More information is available online at <https://www.nrcs.usda.gov/wps/portal/wcc/home/snowClimateMonitoring/30YearNormals/>.

SNOWPACK

Snowpack snow water equivalents (SWE) between April 17 and May 12 increased from 207- to 282 percent of normal for the dates in the northern Sierras; from 240- to 320 percent in the central Sierras; and from 319- to 442 percent in the southern Sierras. More information is available online at <http://cdec.water.ca.gov/snow/current/snow/index2.html>.

PRECIPITATION

As of May 12th, the Northern Sierra-, San Joaquin-, and Tulare Basin Index stations received 126-, 166-, and 194 percent of average. The basins have received between 129- and 190 percent of normal rainfall between October and April. More information is available online at http://cdec.water.ca.gov/snow_rain.html

RESERVOIRS

Total intrastate reservoir storage on April 30, 2023 was 104 percent of average, compared to 105 percent of average at the end of March. Storage at Lake Mead was 48 percent of average, up from 46 percent of average at the end of March. As of May 12th, storage at Shasta Reservoir was 116 percent of average (98 percent of capacity), up from 113 percent of average at the end of March. Oroville Reservoir was 122 percent of average (95 percent of capacity), up from 119 percent of average at the end of March. Don Pedro Reservoir was 94 percent of average (73 percent of capacity), down from 106 percent at the end of March. More information is available online at <https://cdec.water.ca.gov/reservoir.html>.

STREAMFLOW

Forecasts in the Sacramento, San Joaquin, and Tulare basins range between 99 - and 446 percent of the 1991-2020 medians between April and July. NRCS forecasts in the Tahoe, Truckee, Carson, and Walker River basins are all above 200% of the 1999-2020 median. NRCS forecasts for stations in the Klamath Basin and North Coast are also at or above the median. Summaries are provided below.

Sacramento River Streamflow Forecasts - May 1, 2023

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

Sacramento River	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Inflow to Shasta Lk (NWS)	APR-JUL	2220		2340	137%		2640	1710
MF American R nr Auburn (NWS)	APR-JUL	765		805	178%		860	453
Inflow to Shasta Lk (DWR)	OCT-SEP	5590		5900	105%		6400	5643
	APR-JUL	2030		2290	130%		2700	1767
Silver Ck bl Camino Div. Dam (DWR)	APR-JUL			290	185%			157
McCloud R ab Shasta (DWR)	APR-JUL			500	127%			393
Sacramento R nr Red Bluff (NWS)	APR-JUL	3130		2380	99%		3700	2410
NF Feather R at Pulga (DWR)	APR-JUL			1560	185%			842
Inflow Jackson Mdws & Bowman Res (DWR)	APR-JUL			158	153%			103
Feather R at Lk Almanor (DWR)	APR-JUL			440	183%			241
Inflow to Folsom Res (DWR)	OCT-SEP	4360		4640	173%		4970	2689
	APR-JUL	1780		2050	164%		2370	1247
Pit R at Shasta Lk (NWS)	APR-JUL	1200		1270	119%		1370	1070
Pit R at Shasta Lk (DWR)	APR-JUL			1220	123%			992
Inflow to Oroville Res (NWS)	APR-JUL	3000		3100	205%		3420	1510
Inflow to Folsom Res (NWS)	APR-JUL	2120		2210	187%		2320	1180
Yuba R at Smartville (DWR)	OCT-SEP	3440		3630	160%		3920	2273
	APR-JUL	1450		1630	164%		1910	993
N Yuba R bl Goodyears Bar (DWR)	APR-JUL			455	168%			271
Yuba R at Smartville (NWS)	APR-JUL	1490		1540	165%		1680	934
Inflow to Union Valley Res (NWS)	APR-JUL	163		171	178%		180	95.9
N Yuba R bl Goodyears Bar (NWS)	APR-JUL	420		440	164%		475	268
Sacramento R at Shasta (NWS)	APR-JUL	450		480	164%		560	292
Sacramento R nr Red Bluff (DWR)	OCT-SEP	8840		9260	111%		9940	8351
	APR-JUL	2790		3140	127%		3720	2474
S Yuba R nr Langs Crossing (DWR)	APR-JUL			385	162%			237
Cosumnes R at Michigan Bar (NWS)	APR-JUL	230		245	206%		255	119
McCloud R ab Shasta (NWS)	APR-JUL	405		425	115%		480	370
NF American R at N FK Dam (DWR)	APR-JUL			420	175%			240
Sacramento R at Shasta (DWR)	APR-JUL			490	159%			309
NF Feather R nr Prattville (NWS)	APR-JUL	445		465	164%		485	283.6
Inflow to Oroville Res (DWR)	OCT-SEP	6350		6720	155%		7230	4341
	APR-JUL	2750		3090	181%		3560	1710

- 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
Sacramento River	67	266%	50%

Sanjoaquin Streamflow Forecasts - May 1, 2023

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

SanJoaquin	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
MF Stanislaus R bl Beardsley (DWR)	APR-JUL			720	242%			297
Tuolumne R nr Hetch Hetchy (NWS)	APR-JUL	1200		1240	208%		1280	596
Big Ck bl Huntington Lk (DWR)	APR-JUL			270	278%			97
Inflow to New Melones Res (NWS)	APR-JUL	1560		1600	242%		1660	661
Inflow to Millerton Lk (NWS)	APR-JUL	2840		2980	244%		3060	1220
Inflow to New Don Pedro Res (NWS)	APR-JUL	2720		2820	237%		2910	1190
Inflow to Millerton Lk (DWR)	OCT-SEP	4450		4670	263%		4940	1775
	APR-JUL	2930		3130	255%		3380	1229
Cherry & Eleanor CKs, Hetch Hetchy (DWR)	APR-JUL			720	227%			317
Inflow to New Don Pedro Res (DWR)	OCT-SEP	4210		4370	224%		4600	1954
	APR-JUL	2610		2750	225%		2970	1222
Merced R at Pohono Bridge Yosemite (DWR)	APR-JUL			970	263%			369
Cosumnes R at Michigan Bar (DWR)	OCT-SEP	1030		1080	277%		1170	390
	APR-JUL	220		260	195%		350	133
SF San Joaquin R nr Florence Lk (DWR)	APR-JUL			480	255%			188
Inflow to New Melones Res (DWR)	OCT-SEP	2460		2660	225%		2860	1181
	APR-JUL	1450		1630	233%		1820	699
Inflow to Pardee Res (DWR)	OCT-SEP	1460		1560	204%		1680	764
	APR-JUL	870		960	205%		1080	469
Merced R at Pohono Bridge Yosemite (NWS)	APR-JUL	940		975	259%		995	377
Inflow to Lake McClure (NWS)	APR-JUL	1500		1550	258%		1580	601
Inflow to Pardee Res (NWS)	APR-JUL	925		955	219%		990	436
Tuolumne R nr Hetch Hetchy (DWR)	APR-JUL			1320	225%			587

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Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
SanJoaquin	63	284%	45%

Tulare Lake Streamflow Forecasts - May 1, 2023

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

Tulare Lake	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Kaweah R at Terminus Res (DWR)	OCT-SEP	1270		1320	310%		1390	426
	APR-JUL	740		790	286%		850	276
Kaweah R at Terminus Res (NWS)	APR-JUL	790		830	300%		865	277
	Inflow to Pine Flat Res (NWS)	APR-JUL	2970		3170	264%		3280
Inflow to Isabella Res (DWR)	OCT-SEP	2260		2480	369%		2750	672
	APR-JUL	1620		1810	424%		2060	427
Inflow to Pine Flat Res (DWR)	OCT-SEP	4280		4470	268%		4780	1671
	APR-JUL	3030		3200	266%		3480	1204
Tule R at Success Res (DWR)	OCT-SEP	525		570	432%		615	132
	APR-JUL	210		250	446%		290	56
Tule R at Success Res (NWS)	APR-JUL	235		240	407%		255	58.9
	Inflow to Isabella Res (NWS)	APR-JUL	1660		1720	385%		1780
Kern R nr Kernville (DWR)	APR-JUL			1620	427%			379

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Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Tulare Lake	27	354%	33%

Owens Lake Streamflow Forecasts - May 1, 2023

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

Owens Lake	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Owens R (DWR)	APR-JUL			625	271%			231

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Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Owens Lake	2	220%	49%

North Coast Streamflow Forecasts - May 1, 2023

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

North Coast	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Trinity R at Lewiston (DWR)	APR-JUL	800		910	140%		1090	648
Inflow to Clair Engle Lk (NWS)	APR-JUL	835		870	152%		975	574
Scott R nr Fort Jones (NWS)	APR-JUL	260		275	168%		335	164

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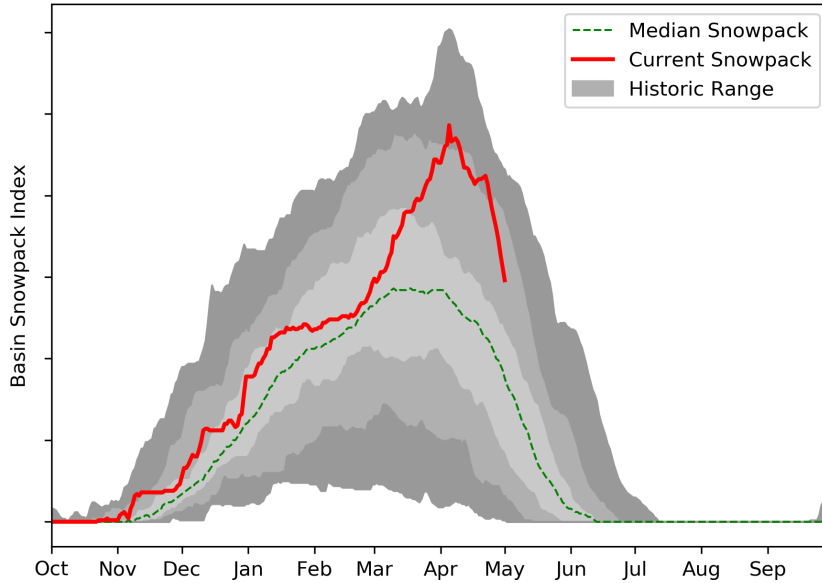
2) Forecasts are For unimpaired flows. Actual flow will be dependent On management of upstream reservoirs And diversions

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
North Coast	8	188%	11%

Klamath Basin Summary

SNOWPACK

Klamath Basin Snowpack

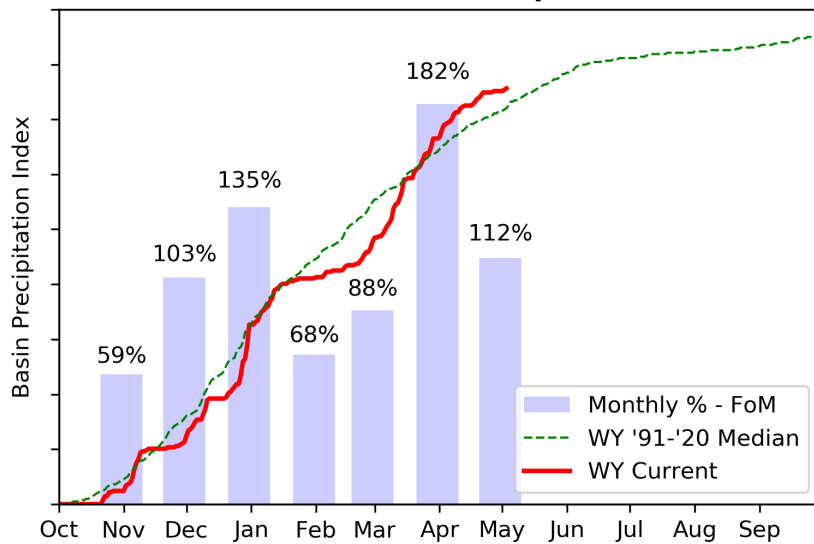


► View snowpack for individual sites by accessing the basin data report [here](#).

As of May 1, the basin snowpack is 178% of median, slightly higher than last month when the basin snowpack was 168% of median.

PRECIPITATION

Klamath Basin Precipitation



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

FoM = First of Month

April precipitation is above normal at 112% of median. Precipitation since the beginning of the water year (October 1 - May 1) is 104% of median.

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Klamath Streamflow Forecasts - May 1, 2023

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

Klamath	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Sprague R nr Chiloquin	MAY-SEP	116	140	157	145%	176	205	108
Upper Klamath Lake Inflow ¹²	MAY-SEP	250	315	350	135%	380	460	260
Gerber Reservoir Inflow								
Clear Lake Inflow								
Williamson R bl Sprague R nr Chiloquin	MAY-SEP	220	250	270	129%	290	320	210

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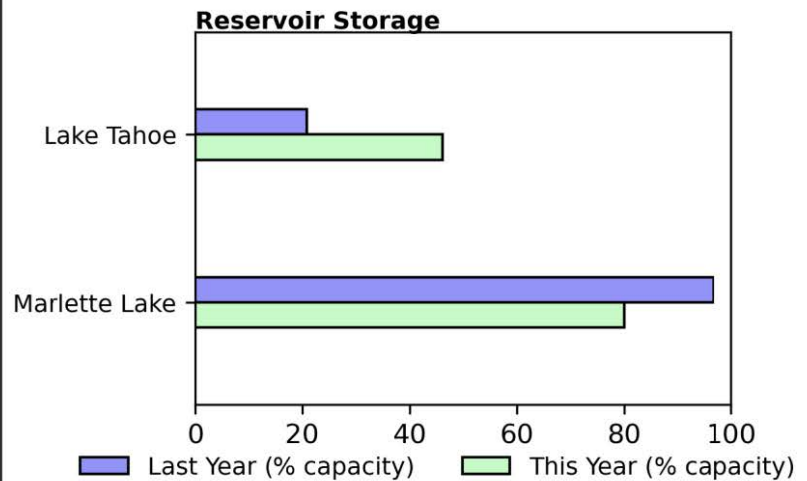
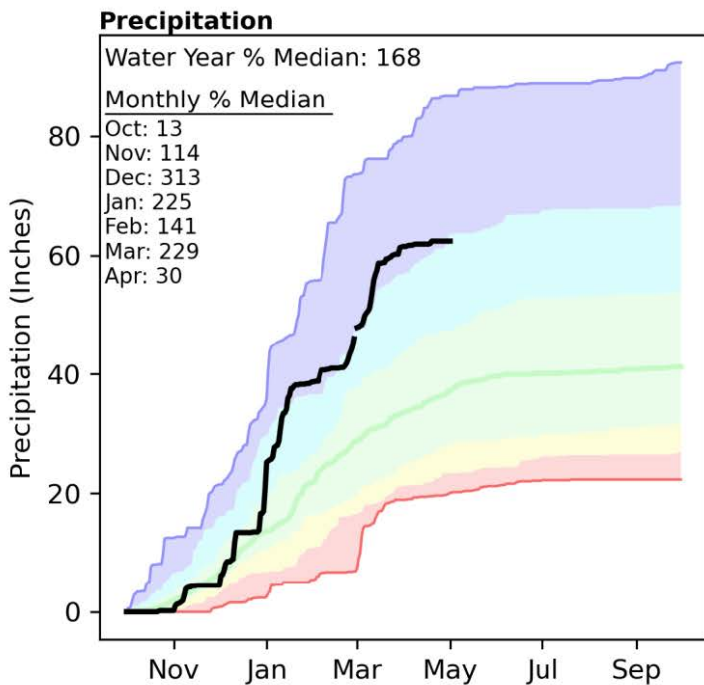
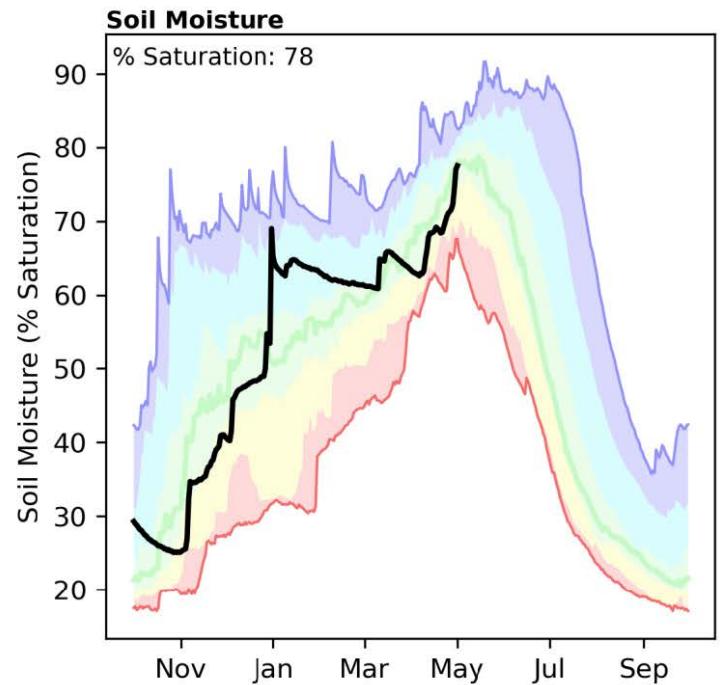
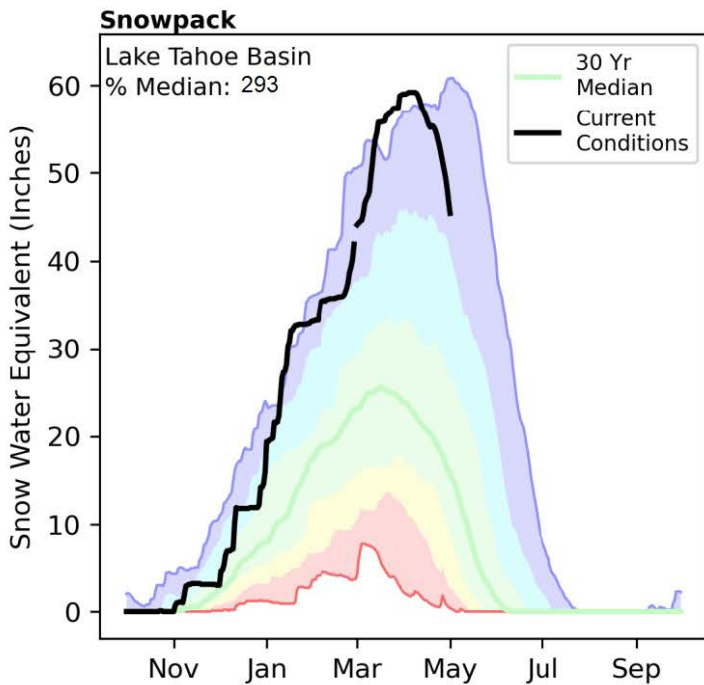
Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Upper Klamath Lake	479.2	336.4	466.3	523.7

Basin Index
of reservoirs

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Klamath	24	155%	61%

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](#)

Provided by:
NRCS NV

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

Tahoe Streamflow Forecasts - May 1, 2023

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

Tahoe	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Lake Tahoe Net Inflow	APR-JUL	330	360	380	376%	400	430	101
	MAY-JUL	270	305	325	691%	345	380	47
Lake Tahoe Rise Gates Closed ¹²	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

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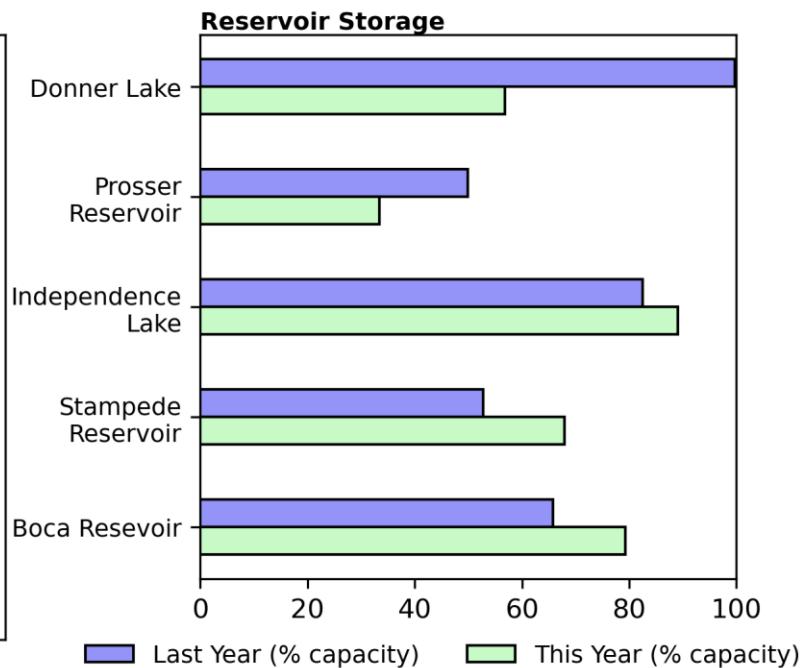
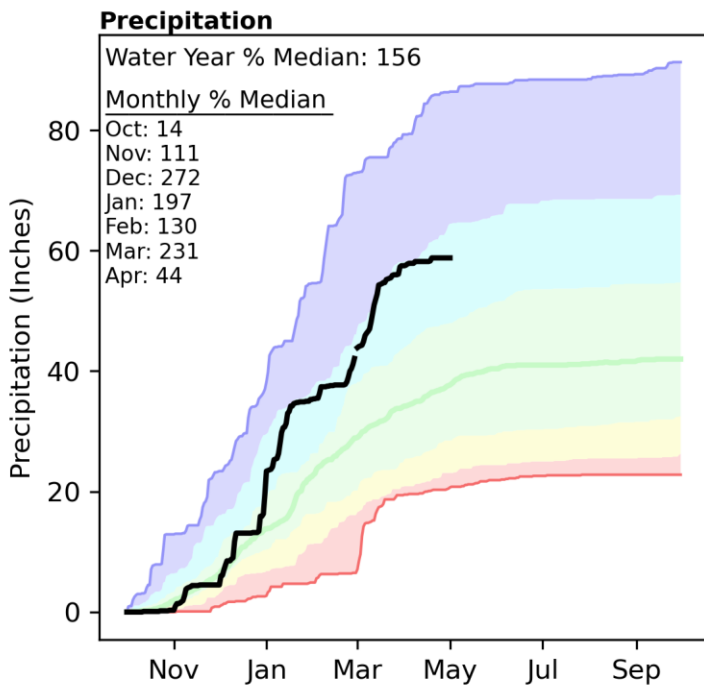
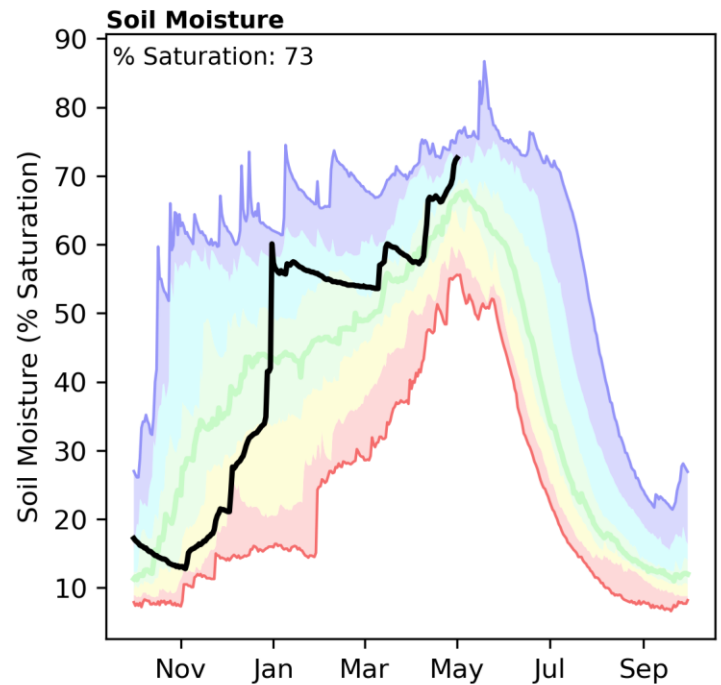
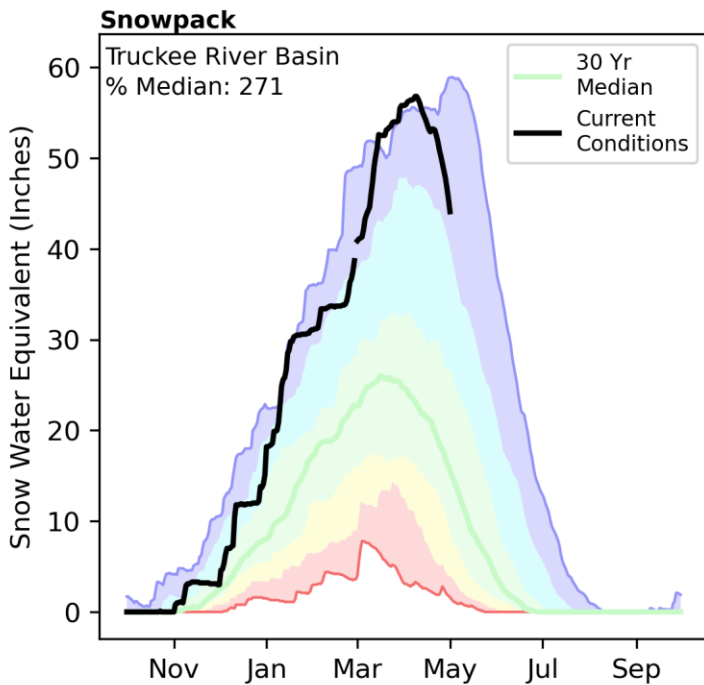
Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Tahoe	342.8	155.5	311.8	744.5

Basin Index
of reservoirs

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Tahoe	12	302%	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](#)

Provided by:
NRCS NV

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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)
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
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
Donner Lake Inflow ²	APR-JUL	28	30	32	213%	34	36	15
	MAY-JUL	20	23	25	305%	27	30	8.2
Truckee R ab Farad Sidewater ²	APR-JUL	225	240	250	278%	260	270	90
	MAY-JUL	181	193	200	317%	205	220	63
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
Stampede Res Local Inflow ²	APR-JUL	150	158	164	278%	170	178	59
	MAY-JUL	106	117	125	347%	133	144	36
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
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
Prosser Ck Res Inflow ²	APR-JUL	77	82	85	243%	88	93	35
	MAY-JUL	59	63	66	300%	69	73	22
Truckee R at Farad ²	APR-JUL	590	615	630	280%	645	670	225
	MAY-JUL	450	470	490	353%	505	525	139

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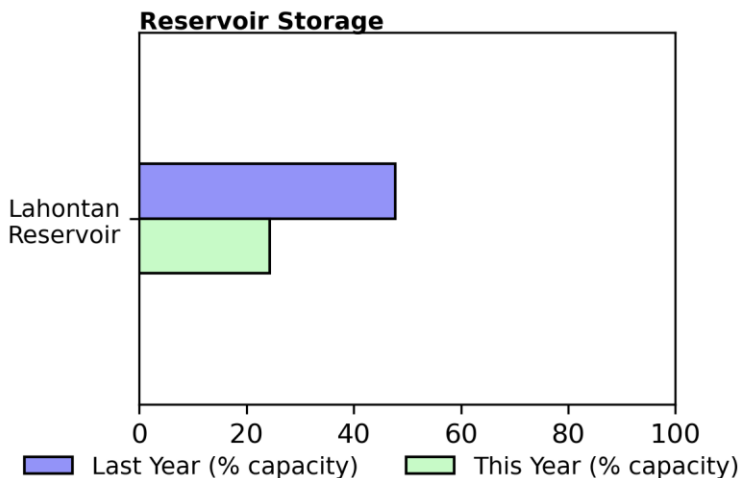
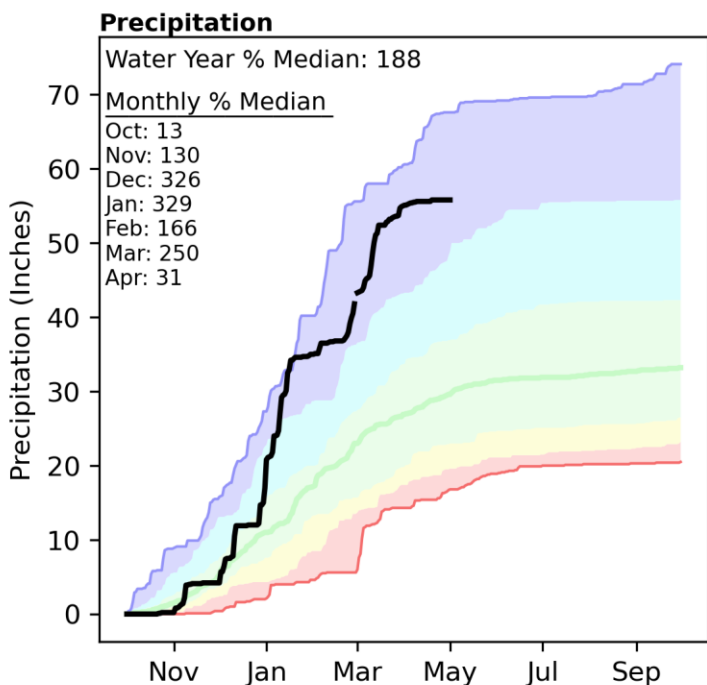
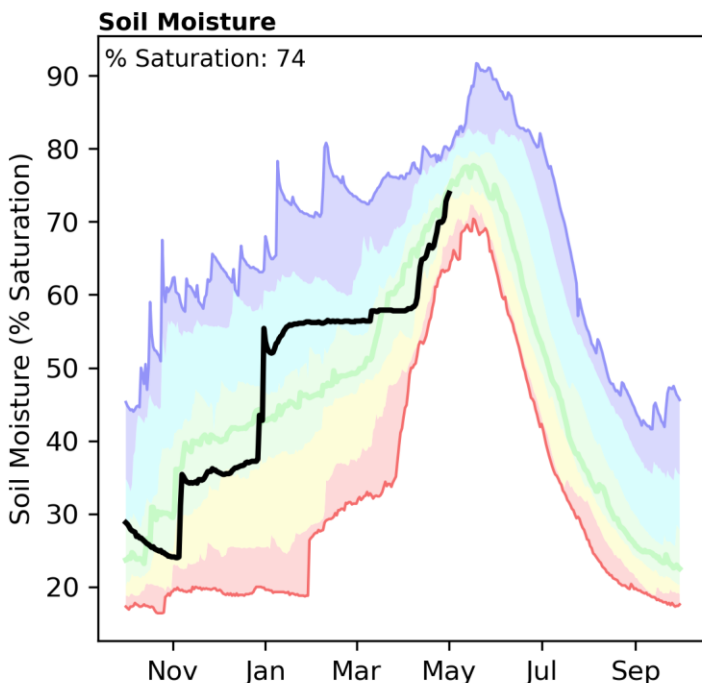
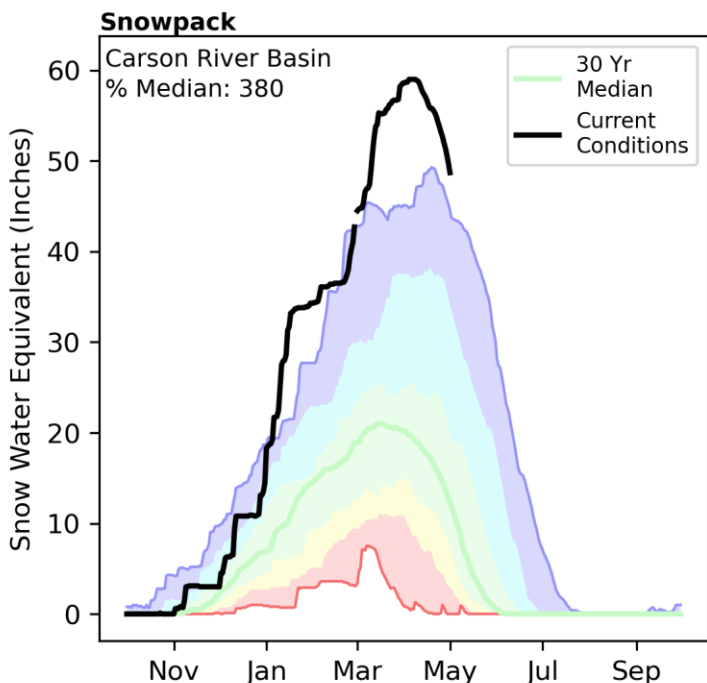
Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Independence Lake	15.4	14.3	15.5	17.3
Martis Reservoir			0.9	35.8
Stampede Reservoir	153.9	119.4	154.8	226.5
Donner Lake	5.4	9.5	6.3	9.5
Boca Reservoir	32.4	26.9	25.7	40.9
Prosser Reservoir	10.0	14.9	13.7	29.8

Basin Index
of reservoirs

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Truckee	15	272%	72%

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](#)

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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

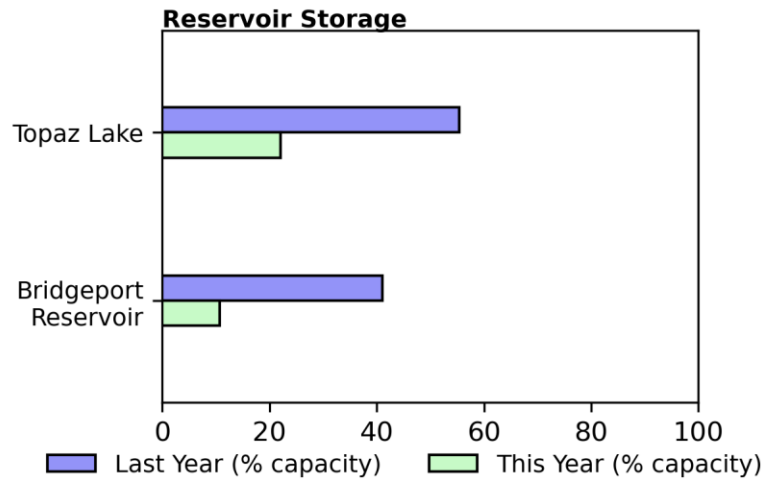
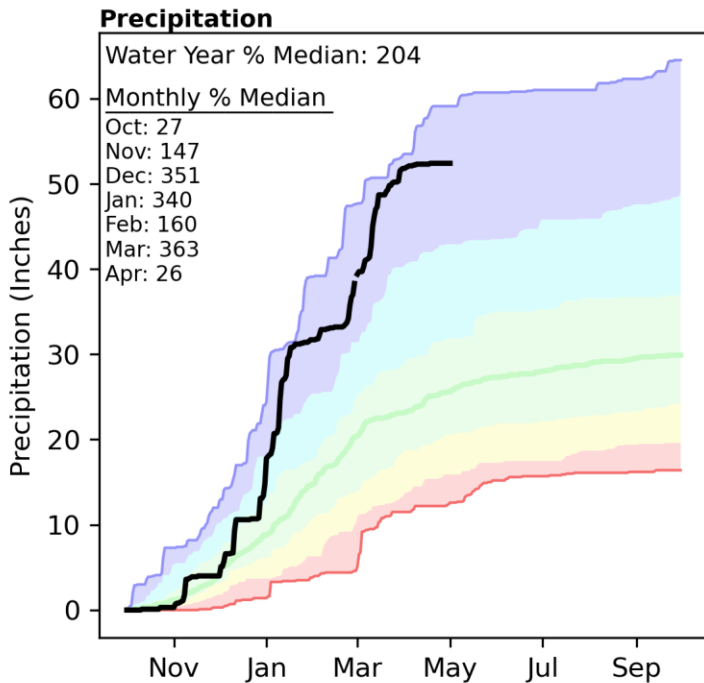
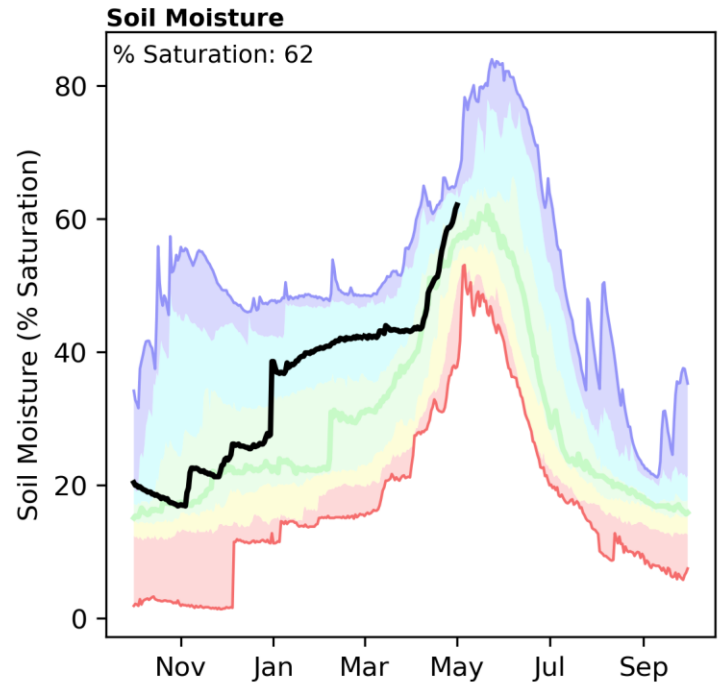
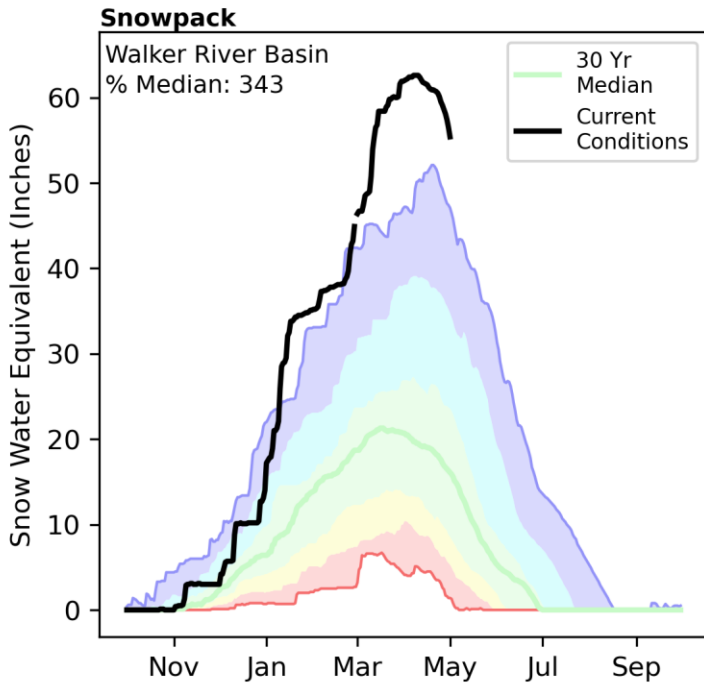
Carson	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
EF Carson R nr Gardnerville								
	APR-JUL	525	540	555	338%	565	580	164
	MAY-JUL	420	435	450	388%	465	480	116
	200 cfs	19 Sep	26 Sep	01 Oct		06 Oct	13 Oct	14 Jul
	500 cfs	13 Aug	25 Aug	02 Sep		10 Sep	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

- 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
Carson	14	380%	44%

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](#)

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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 nr Coleville	APR-JUL	400	415	425	289%	435	450	147
	MAY-JUL	370	385	395	324%	405	420	122
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

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

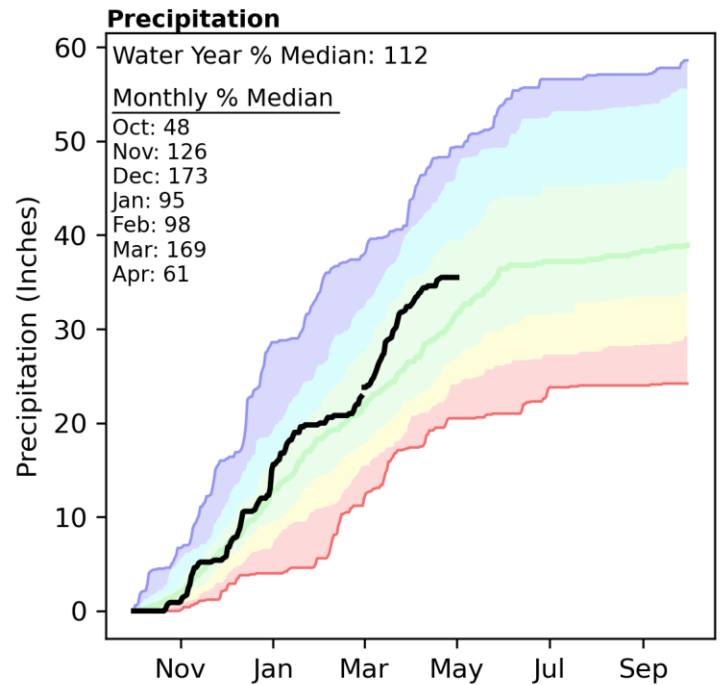
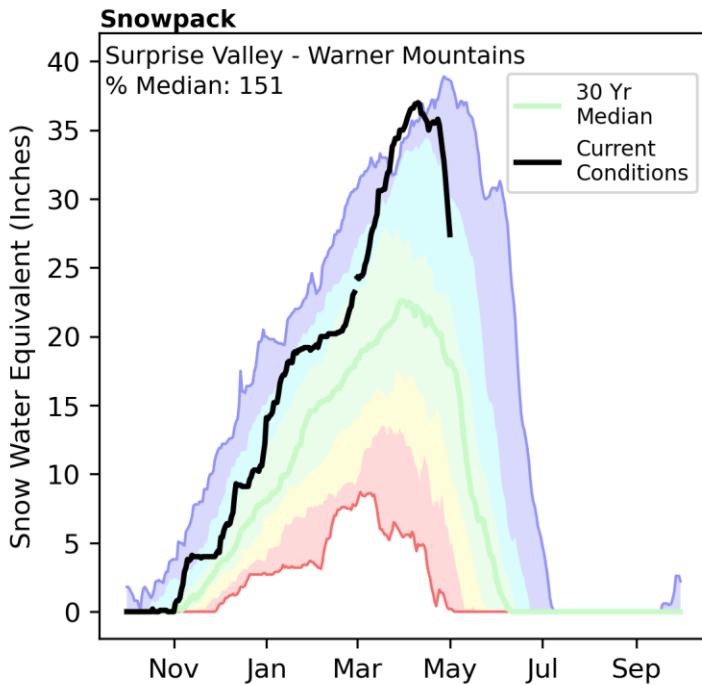
Reservoir Storage End of April, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Bridgeport Reservoir	4.5	17.4	23.3	42.5

Basin Index
of reservoirs

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Walker	8	344%	55%

Surprise Valley - Warner Mountains | May 1, 2023

Snowpack in the Surprise Valley - Warner Mountains is well above normal at 151% of median, compared to 73% at this time last year. Precipitation in April was well below normal at 61%, which brings the seasonal accumulation (October-April) to 112% of median.



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

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Data Current As of: 5/8/2023 5:39:01 PM

Surprise Valley-Warners - May 1, 2023

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Surprise Valley-Warners	2	151%	73%

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

- 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

Basin Index
of reservoirs

Watershed Snowpack Analysis May 1, 2023	# of Sites	% Median	Last Year % Median
Colorado	200	169%	77%

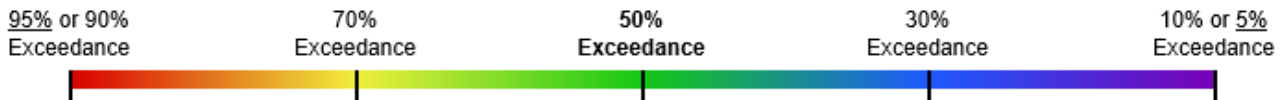
Appendix: Interpreting the Streamflow Forecast Chart

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

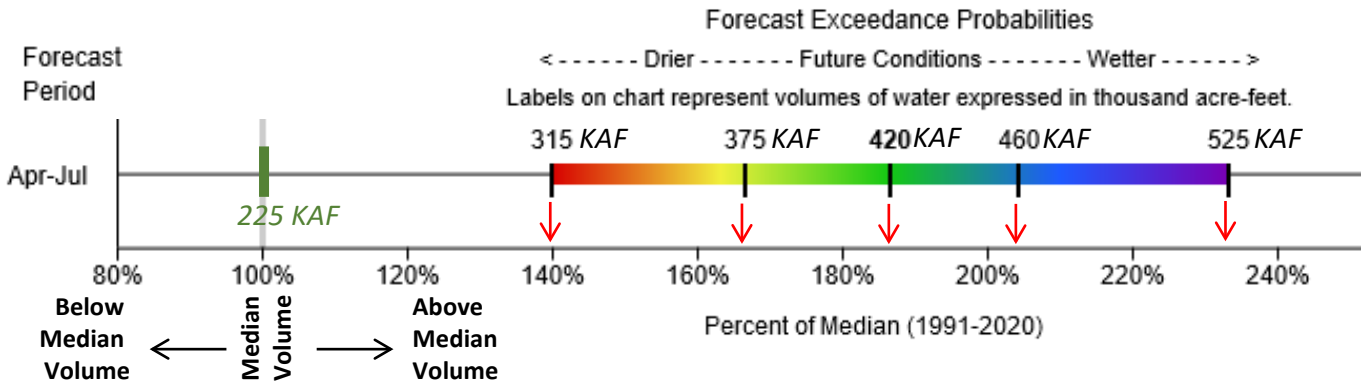
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Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
APR-JUL	315	375	420	187%	460	525	225

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.

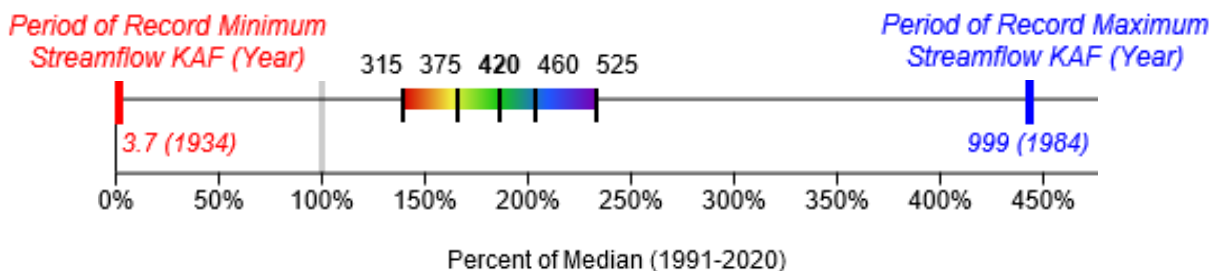


The numbers above the forecast bar are the five exceedance probability volumes in thousand acre-feet (KAF). Each exceedance forecast's percent of median can be estimated by looking at the horizontal axis. The green line and number centered above 100% on the horizontal axis represents the 1981-2010 historical 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 is displayed. The minimum is represented by a heavy red line, while the maximum is represented by a heavy blue line. The numbers below the red and blue lines represent the volume in KAF and the year it occurred in parentheses.

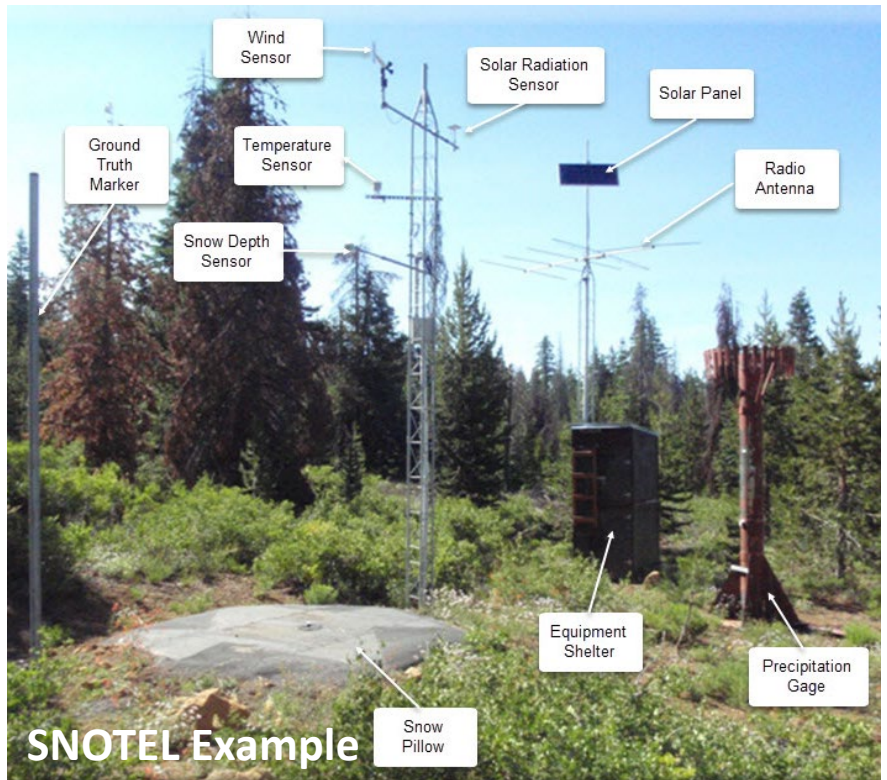


[Click here](#) for an online version which allows users to see averages instead of medians, as well as historic forecasts.

Appendix - SNOTEL and Snow Course Overview

SNOTEL

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



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

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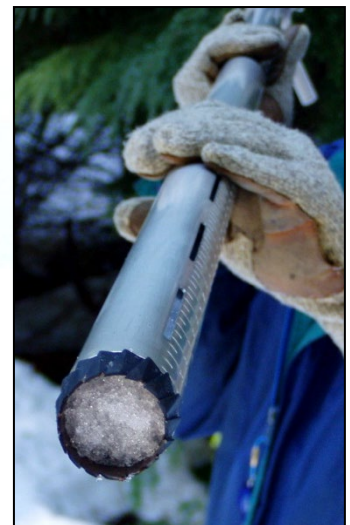
Snow Water Equivalent (SWE):

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

Issued by
Terry Cosby, Chief
Natural Resources Conservation Service
U.S. Department of Agriculture
Washington, D.C.



Released by
Carlos Suarez, State Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
Davis, CA

For questions, please contact Greg Norris, California
NRCS State Conservation Engineer at
Greg.Norris@usda.gov

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California Water Supply Outlook

