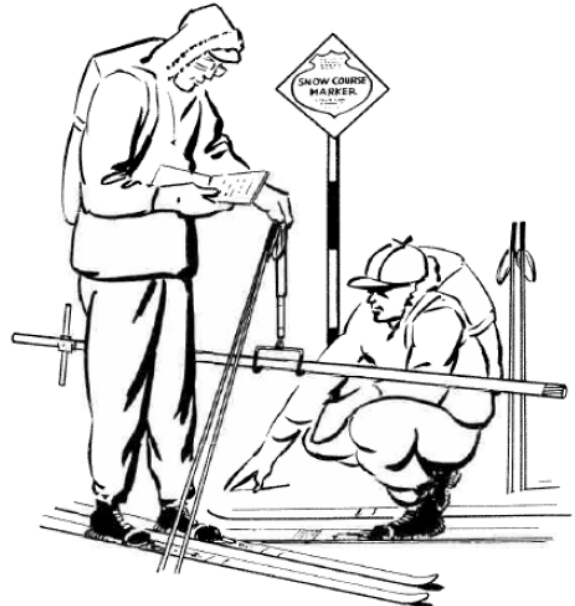
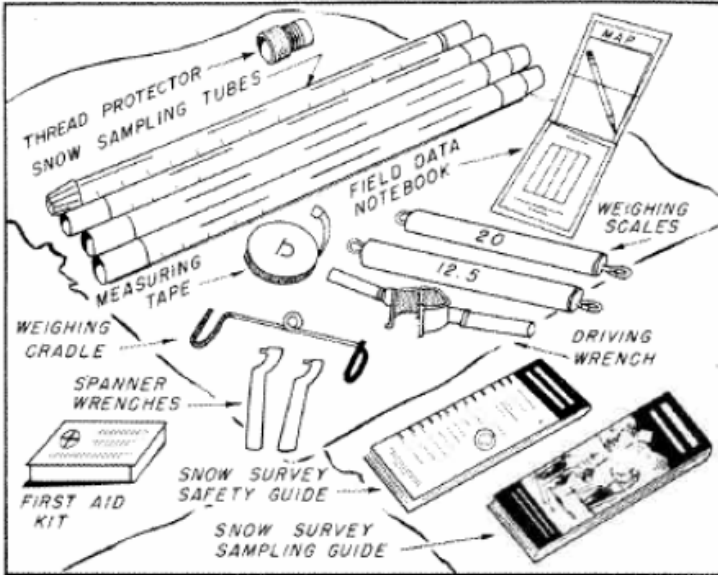


California Water Supply Outlook Report

February, 2022

Snow Sampling Kit



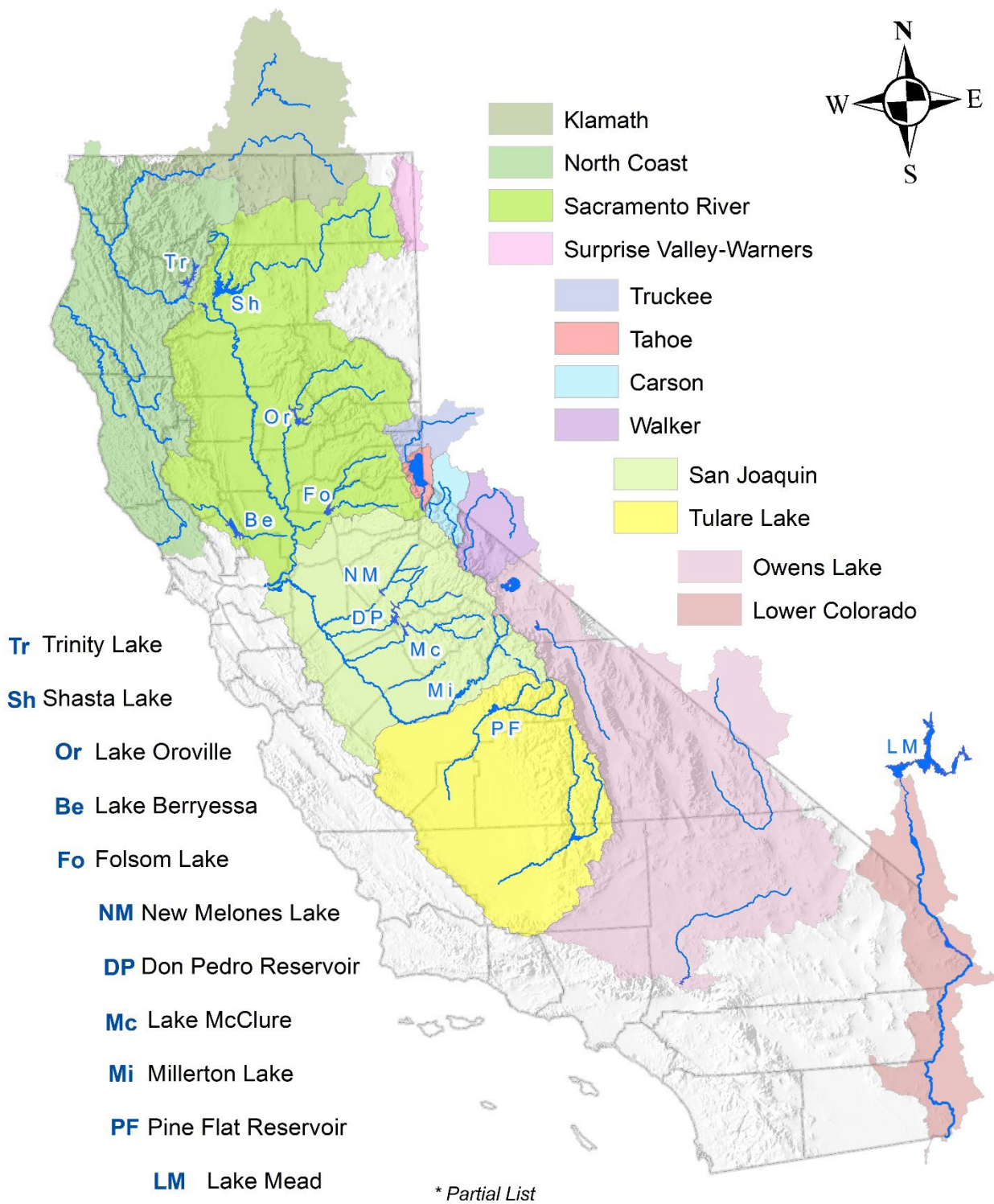
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Cover: From the Snow Survey Sampling Guide (USDA- Agricultural Handbook 169). Visit [NRCS' Water and Climate Center's Publications site](#) for more information.

California Forecast Basins, Major Rivers, and Large Reservoirs*



STATE OF CALIFORNIA GENERAL OUTLOOK

February, 2022

NEW 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

Snow gages in the northern-, central-, and southern mountains have seen a steady decrease in snow pack percent of normal. As of February 16, 2022, the snow water equivalent percent of normal for the three Sierra regions were 68-, 74-, and 75-percent, respectively. Since last month's report, the statewide average snowpack has dropped substantially, from 128 percent on January 14th to 72 percent on February 16.

More information is available online at <http://cdec.water.ca.gov/snow/current/snow/index2.html>.

PRECIPITATION

After an up and down season to date, the Northern Sierra-, San Joaquin-, and Tulare Basin Index stations are currently at 98-, 85-, and 78 percent of their monthly averages as of February 16, 2020, with a downward trend for the rest of the month.

More information is available online at http://cdec.water.ca.gov/snow_rain.html

RESERVOIRS

Most reservoirs as of February 16 had storages at normal amounts, or within plus or minus 30% of normal. Several major reservoirs such as San Antonio, Nacimiento, San Luis, Shasta, continue to lag in storage volumes. In the Colorado River Basin, the combined reservoir storage in Lake Powell and Lake Mead is 67 percent of its historical average.

More information is available online at http://cdec.water.ca.gov/snow/reservoir_ss.html.

STREAMFLOW

NWS forecasts are both above and below the 1991-2020 average between April and July. However, at this point, there is no specific basin that is extremely low or high on the runoff forecast. Summaries for each basin are provided below.

Sacramento River Streamflow Forecasts - February 1, 2022

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	815	960	1240	71%	1700	2160	1738.5
MF American R nr Auburn (DWR)								
MF American R nr Auburn (NWS)	APR-JUL	225	270	385	83%	570	685	461.7
Inflow to Shasta Lk (DWR)	OCT-SEP	3390		4450	79%		7070	5643
	APR-JUL	800		1340	76%		2480	1767
Silver Ck bl Camino Div. Dam (DWR)	APR-JUL			155	99%			157
McCloud R ab Shasta (DWR)	APR-JUL			280	71%			393
Sacramento R nr Red Bluff (NWS)	APR-JUL	1180	1370	1820	60%	2490	3280	3026
MF Feather R nr Clio (DWR)								
NF Feather R at Pulga (DWR)	APR-JUL			740	88%			842
Inflow Jackson Mdws & Bowman Res (DWR)								
Feather R at Lk Almanor (DWR)	APR-JUL			220	91%			241
Inflow to Folsom Res (DWR)	OCT-SEP	1810		2700	100%		4400	2689
	APR-JUL	630		1170	94%		2210	1247
Pit R at Shasta Lk (NWS)	APR-JUL	180	220	270	25%	370	445	1080.2
Silver Ck bl Camino Div. Dam (NWS)	APR-JUL	81	93	136	79%	185	225	171.6
Pit R at Shasta Lk (DWR)	APR-JUL			780	79%			992
Inflow to Oroville Res (NWS)	APR-JUL	565	735	1100	72%	1720	2130	1533.3
Inflow to Folsom Res (NWS)	APR-JUL	550	670	935	78%	1430	1770	1195.3
Yuba R at Smartville (DWR)	OCT-SEP	1460		2240	99%		3580	2273
	APR-JUL	490		960	97%		1760	993
N Yuba R bl Goodyears Bar (DWR)	APR-JUL			260	96%			271
Yuba R at Smartville (NWS)	APR-JUL	455	610	805	85%	1160	1520	949.9
Inflow to Union Valley Res (NWS)	APR-JUL	47	55	78	80%	104	128	97.5
N Yuba R bl Goodyears Bar (NWS)	APR-JUL	128	178	225	83%	320	405	272.3
Sacramento R at Shasta (NWS)	APR-JUL	105	147	230	78%	350	450	296.6
Sacramento R nr Red Bluff (DWR)	OCT-SEP	4900		6480	78%		10700	8351
	APR-JUL	1200		1870	76%		3680	2474
S Yuba R nr Langs Crossing (DWR)	APR-JUL			230	97%			237
Cosumnes R at Michigan Bar (NWS)	APR-JUL	53	71	100	82%	174	265	121.5
McCloud R ab Shasta (NWS)	APR-JUL	180	220	270	72%	370	445	374.5
NF American R at N FK Dam (DWR)	APR-JUL			230	96%			240
Sacramento R at Shasta (DWR)	APR-JUL			220	71%			309
SF Feather R at Ponderosa Dam (DWR)								
NF Feather R nr Prattville (NWS)	APR-JUL	132	157	210	74%	255	300	283.6
Inflow to Oroville Res (DWR)	OCT-SEP	3040		4200	97%		7240	4341
	APR-JUL	880		1470	86%		3010	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 February 1, 2022	# of Sites	% Median	Last Year % Median
Sacramento River	70	114%	70%

Sanjoaquin Streamflow Forecasts - February 1, 2022

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			290	98%			297
Tuolumne R nr Hetch Hetchy (NWS)	APR-JUL	380	455	540	89%	685	790	605.2
Big Ck bl Huntington Lk (DWR)	APR-JUL			95	98%			97
Inflow to New Melones Res (NWS)	APR-JUL	345	445	590	88%	820	990	672.1
Inflow to Millerton Lk (NWS)	APR-JUL	770	960	1200	97%	1530	1850	1238.4
NF Mokelumne R nr West Point (DWR)								
Inflow to New Don Pedro Res (NWS)	APR-JUL	675	805	1130	94%	1420	1810	1208.3
Inflow to Millerton Lk (DWR)	OCT-SEP	1120		1750	99%		2640	1775
	APR-JUL	670		1170	95%		1890	1229
Cherry & Eleanor CKs, Hetch Hetchy (DWR)	APR-JUL			275	87%			317
Inflow to New Don Pedro Res (DWR)	OCT-SEP	1160		1720	88%		2730	1954
	APR-JUL	640		1060	87%		1830	1222
Merced R at Pohono Bridge Yosemite (DWR)	APR-JUL			320	87%			369
Cosumnes R at Michigan Bar (DWR)	OCT-SEP	195		340	87%		780	390
	APR-JUL	30		90	68%		280	133
SF San Joaquin R nr Florence Lk (DWR)	APR-JUL			185	98%			188
Inflow to New Melones Res (DWR)	OCT-SEP	680		1100	93%		1780	1181
	APR-JUL	340		640	92%		1140	699
Inflow to Pardee Res (DWR)	OCT-SEP	480		770	101%		1200	764
	APR-JUL	240		450	96%		760	469
Merced R at Pohono Bridge Yosemite (NWS)	APR-JUL	255	280	355	93%	480	560	382.3
Inflow to Lake McClure (NWS)	APR-JUL	345	375	505	83%	715	950	610.6
Inflow to Lake McClure (DWR)								
Inflow to Pardee Res (NWS)	APR-JUL	215	275	370	83%	500	615	443.5
Tuolumne R nr Hetch Hetchy (DWR)	APR-JUL			510	87%			587

- 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 February 1, 2022	# of Sites	% Median	Last Year % Median
SanJoaquin	63	97%	71%

Tulare Lake Streamflow Forecasts - February 1, 2022

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	190		335	79%		600	426
	APR-JUL	120		230	83%		430	276
Kaweah R at Terminus Res (NWS)	APR-JUL	137	169	240	85%	340	465	282.1
	APR-JUL	760	855	1060	87%	1430	1640	1222.8
Inflow to Pine Flat Res (NWS)	OCT-SEP	295		460	68%		855	672
	APR-JUL	180		300	70%		590	427
Inflow to Isabella Res (DWR)	OCT-SEP	885		1420	85%		2320	1671
	APR-JUL	610		1050	87%		1790	1204
Tule R at Success Res (DWR)	OCT-SEP	40		74	56%		190	132
	APR-JUL	14		56	100%		95	56
Tule R at Success Res (NWS)	APR-JUL	15	21	39	65%	60	106	60.3
	APR-JUL	174	205	285	63%	410	560	455.3
NF Kings R nr Cliff Camp (DWR)	APR-JUL	174	205	285	63%	410	560	455.3
	APR-JUL			270	71%			379

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 February 1, 2022	# of Sites	% Median	Last Year % Median
Tulare Lake	41	105%	51%

**North Coast
Streamflow Forecasts - February 1, 2022**

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)	OCT-SEP	545		935	71%		1640	1322
	APR-JUL	200		430	66%		850	648
Inflow to Clair Engle Lk (NWS)	APR-JUL	185	235	375	64%	565	725	584
Scott R nr Fort Jones (NWS)	APR-JUL	37	45	88	53%	132	173	167

- 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 February 1, 2022	# of Sites	% Median	Last Year % Median
North Coast	7	64%	73%

Klamath Streamflow Forecasts - February 1, 2022

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	FEB-SEP	146	200	245	102%	290	365	240
	MAR-SEP	121	172	210	98%	255	325	215
Upper Klamath Lake Inflow ¹²	FEB-SEP	335	535	625	100%	715	915	625
	MAR-SEP	250	430	510	98%	590	770	520
Gerber Reservoir Inflow ²	FEB-JUN	10.3	21	29	112%	36	47	26
Clear Lake Inflow ²	FEB-JUN	-12.3	16	35	192%	54	83	18.2
Williamson R bl Sprague R nr Chiloquin	FEB-SEP	275	360	420	100%	480	565	420
	MAR-SEP	230	310	365	101%	420	500	360

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 January, 2022	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Upper Klamath Lake	301.1	269.5	330.6	523.7

Basin Index
of reservoirs

Watershed Snowpack Analysis February 1, 2022	# of Sites	% Median	Last Year % Median
Klamath	31	86%	76%

Tahoe Streamflow Forecasts - February 1, 2022

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	MAR-JUL	63	142	195	140%	250	325	139
	APR-JUL	42	100	140	139%	180	240	101
Lake Tahoe Rise Gates Closed ¹	OCT-HIGH	0.67	1.86	2.4	107%	2.9	4.1	2.24
	MAR-HIGH	0.55	1.21	1.7	98%	2.2	3.3	1.73
	APR-HIGH	0.5	0.9	1.3	99%	1.67	2.2	1.31

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 January, 2022	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Tahoe	125.1	322.2	221.8	744.5

Basin Index
of reservoirs

Watershed Snowpack Analysis February 1, 2022	# of Sites	% Median	Last Year % Median
Tahoe	20	105%	69%

Truckee Streamflow Forecasts - February 1, 2022

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	MAR-JUL	47	84	110	128%	136	173	86
	APR-JUL	43	65	88	122%	101	145	72
Independence Lk Inflow ²	MAR-JUL	10.2	13.4	15.5	136%	17.6	21	11.4
	APR-JUL	9.1	12	14	133%	16	18.9	10.5
Donner Lake Inflow ²	MAR-JUL	7.3	13.7	18	94%	22	29	19.2
	APR-JUL	5.2	10.4	14	93%	17.6	23	15
Truckee R ab Farad Sidewater ²	MAR-JUL	56	95	121	114%	147	186	106
	APR-JUL	50	86	110	122%	134	170	90
Boca Res Local Inflow ²	MAR-JUL	0.35	2.9	6	136%	9.1	13.7	4.4
	APR-JUL	0.11	1.08	2	132%	3	4.6	1.52
Stampede Res Local Inflow ²	MAR-JUL	42	73	94	136%	115	146	69
	APR-JUL	32	61	80	136%	99	128	59
Martis Ck Res Inflow ²	MAR-JUL	4.1	9.6	13.4	151%	17.2	23	8.9
	APR-JUL	0.69	5.3	8.5	149%	11.7	16.3	5.7
Sagehen Ck nr Truckee	MAR-JUL	2.2	4.8	6.5	135%	8.2	10.8	4.8
	APR-JUL	1.5	3.9	5.5	134%	7.1	9.5	4.1
Prosser Ck Res Inflow ²	MAR-JUL	32	46	55	131%	64	78	42
	APR-JUL	24	37	45	129%	53	66	35
Truckee R at Farad ²	MAR-JUL	144	245	315	119%	385	485	265
	APR-JUL	145	198	260	116%	300	385	225

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 January, 2022	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Independence Lake	12.6	11.1	14.1	17.3
Martis Reservoir	0.9	0.9	0.8	35.8
Stampede Reservoir	93.8	101.5	151.4	226.5
Donner Lake	3.3	3.1	3.7	9.5
Boca Reservoir	26.1	7.0	10.7	40.9
Prosser Reservoir	7.5	5.9	9.7	29.8

Basin Index
of reservoirs

Watershed Snowpack Analysis February 1, 2022	# of Sites	% Median	Last Year % Median
Truckee	17	112%	71%

Carson Streamflow Forecasts - February 1, 2022

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								
	MAR-JUL	103	170	215	117%	260	325	184
	APR-JUL	83	144	185	113%	225	285	164
	200 cfs	18 Jun	11 Jul	27 Jul		12 Aug	04 Sep	14 Jul
	500 cfs	02 Jun	21 Jun	04 Jul		17 Jul	05 Aug	20 Jun
WF Carson R nr Woodfords								
	MAR-JUL	31	50	64	128%	78	97	50
	APR-JUL	23	43	56	124%	69	89	45

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 February 1, 2022

	# of Sites	% Median	Last Year % Median
Carson	16	101%	76%

Walker Streamflow Forecasts - February 1, 2022

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	MAR-AUG	12.8	47	70	137%	93	127	51
	APR-AUG	6.6	38	60	136%	82	113	44
W Walker R nr Coleville	MAR-JUL	90	137	170	110%	205	250	154
	APR-JUL	76	123	155	105%	187	235	147
W Walker R bl L Walker R nr Coleville	MAR-JUL	104	146	175	110%	205	245	159
	APR-JUL	89	131	160	105%	189	230	153

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 January, 2022	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Bridgeport Reservoir	15.7	12.8	15.6	42.5

Basin Index
of reservoirs

Watershed Snowpack Analysis February 1, 2022	# of Sites	% Median	Last Year % Median
Walker	8	101%	74%

Data Current As of: 2/15/2022 8:58:25 AM

Surprise Valley-Warners - February 1, 2022

Watershed Snowpack Analysis February 1, 2022	# of Sites	% Median	Last Year % Median
Surprise Valley-Warners	6	87%	76%

Colorado Streamflow Forecasts - February 1, 2022

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	2850	4210	5290	86%	6490	8480	6130

- 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 January, 2022	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lake Powell	6335.2	9638.5	13471.0	24322.0

Basin Index
of reservoirs

Watershed Snowpack Analysis February 1, 2022	# of Sites	% Median	Last Year % Median
Colorado	211	106%	75%

Owens Lake Streamflow Forecasts - February 1, 2022

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			197	85%			231

- 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 February 1, 2022	# of Sites	% Median	Last Year % Median
Owens Lake	13	123%	70%

HOW FORECASTS ARE MADE

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snowcourses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, 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, for which 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. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. 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. 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, 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, 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 for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

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