Colorado Water Supply Outlook Report

March 1st, 2025



Top Left: Moose browsing near Como snow course. Top Right: Surveying Independence Pass snow course.

Bottom Left: Kartina Spinelli measuring Horseshoe Mountain snow course. Bottom Right: Patty Knupp measuring Old La Veta Pass snow course.

Photos By: Katrina Spinelli, Zack Wilson, Maureen Cassidy and Joseph Lobato

REMINDER: We are soliciting field work photos from the field again this year. Each month we will pick one to grace the cover of this report! Please include information on where, when and of who/what the photo was taken.

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Colorado Statewide Water Supply Conditions for March 1st <u>Summary</u>



*For the above graph, snow water equivalent (SWE) values are calculated using daily SNOTEL data only. SWE numbers presented in the text are values from the first of the month and include manual Snow Course measurements along with SNOTEL data.

Colorado statewide air temperatures for the month of February were at record highs. Air temperatures this month predominantly ranged from median to significantly above median with the only exception near mid-month (Feb. 12th), where the daily average air temperature was at 1.6 degrees Fahrenheit. Which for this time of the water year is near minimum period of record (POR) or -2.5 degrees Fahrenheit. Daily average air temperatures early in the month of February, specifically from the 2nd to the 6th, ranged between 31 and 37 degrees Fahrenheit which is not only significantly above median POR (17 degrees) but also above the maximum POR (29 degrees).

Colorado statewide precipitation accumulation as of March 1st for water year 2025 was 13.3 inches which is near median at 91 percent. For the month of February, the northern Colorado basins (South Platte, combined Yampa-White-Little Snake, combined Laramie and North Platte, and Colorado Headwaters) were all above median ranging between 113 to 130 percent. Whereas the southern Colorado basins (Gunnison, Arkansas, Upper Rio Grande, and combined San Miguel-Dolores-Animas-San Juan) were all below median ranging from 84 to 50 percent.

When accounting for snow course data as well as SNOTEL data, which the above chart does not, Colorado Statewide snowpack, or snow water equivalent (SWE), is at 91 percent of median. As expected, precipitation accumulation tracks similar to that of snowpack for the above-mentioned northern basins, which, are too above median ranging from 96 to 105 percent, with the above-mentioned southern basins below median ranging from 62 to 85 percent. In recent years, from 2019 to 2024, the snowpack of these southern basins never dipped below 82 percent of median and was predominantly above 90 percent of median with some years the month of February being above 120 percent of median. These southern basins have not seen such little snow for the month of February since 2018 and before that, 2006. These dryer climates of increased temperature and reduced precipitation and snowfall are often associate with La Nina climates conditions which the southern parts of state of Colorado have been experiencing since December of this water year.

Snowpack acts as a natural reservoir for volumetric streamflow, which highlights the direct relationship between SWE and drought. The March 1st 6-month forecasts showcase well below median streamflow volumes for the southern basins, specifically the Gunnison, the combined San Miguel-Dolores-Animas-San Juan, and the Upper Rio Grande. With April 8 marking the typical peak SWE date for the state, three of the four primary snow accumulation months have already passed limiting the remaining window for additional snowpack accumulation.

<u>Snowpack</u>



As of March 1st, Colorado's snowpack is 91 percent median including data from both Snow Courses and SNOTELs, which is similar to last month's 90 percent of median snowpack. Similar trends persist as the northern part of the state exists near normal conditions and the southern half of the state falls below normal conditions. The South Platte River basin exhibits the best snowpack conditions in the state compared to normal, ending February with 105 percent of median which is the exact same as last month. The Laramie and North Platte River basin comes in second with 102 percent of normal, followed by the Colorado Headwaters at 101 percent and the combined Yampa-White-Little Snake is at 96 percent of normal snowpack. Interestingly, Tower SNOTEL, located north-east of Steamboat Springs, currently has the largest snowpack in the state with 35.1 in of liquid water in the snowpack. Tower has 46 years of data and is at normal with 100 percent of median. As for the southern basins, the Gunnison and Arkansas are at 85 and 70 percent of median snowpack. The Upper Rio Grande and the combined San Miguel-Dolores-Animas-San Juan River basins are at 62 and 64 percent of median. As of today, there has only been one dust-on-snow event in the end of January. With a low snowpack, a dust-on-snow event could be detrimental. Cascade #2 SNOTEL, located south of Silverton in the combined San Miguel-Dolores-Animas-San Juan watershed, recorded its lowest snow water equivalent (SWE) with only 3.5 in of liquid water in the snowpack. The site has 35 years of data and is currently 38 percent of median. As next month is typically peak SWE, the NOAA (National Ocean and Air Administration) seasonal outlook is projecting an ongoing warmer and drier trend for the rest of the winter.

Precipitation



In February 2025 the average precipitation was 3.0 inches of accumulation across the state of Colorado, contributing to a total of 13.3 inches of precipitation for the 2025 water year to-date. While total accumulation for the water year is 92 percent of the 30-year median (compared to 90 percent last month) on a state-wide scale, this overall trend conceals a significant shift at the regional/basin level, where precipitation has significantly increased across the western basins and decreased across the eastern basins of the state compared to January 2025. The Laramie-North Platte, Yampa-White-Little Snake, Colorado Headwaters, Gunnison, and San Miguel-Dolores-San Juan all increased their percent-median accumulation 24 to 40 percent compared to the prior month, now registering 130, 124, 113, 84, and 61 percent median precipitation respectively. Comparatively the percent-median accumulation decreased 8 to 24 percent in the three easternmost basins, with the South Platte, Arkansas, and Upper Rio Grande now at 113, 66, and 50 percent median precipitation in February 2025. While drought conditions are less severe in the Gunnison and San Miguel-Dolores-San Juan than the totals observed in January 2025, overall lower precipitation remains evident across the southern half of the state. For future precipitation forecasts see the following National Weather Service's 6-10 day forecast here.

Reservoir Storage



As of March 1st, 2025, reservoir storage in each of the Colorado basins have remained very consistent with the percentmedian trends reported last month. Storage in the Yampa-White-Little Snake, Eastern Arkansas, South Platte, Colorado Headwaters, Gunnison, and Eastern South Platte continued to follow last month's near-median trend; measuring 107, 101, 101, 98, 97, and 93 percent of median water storage respectively. This represents less than five percent fluctuation from the percent-of-median storage reported in each basin at the end of January 2025. The three southernmost basins continue to deviate from the 30-year median on a scale consistent with last month's trend, with the Upper Rio Grande and Arkansas both above median storage (121 and 113 percent, respectively) while the combined San Miguel-Dolores-Animas-San Juan basin contains the lowest water storage volume percent of median (80 percent) and is the only basin this month below 90 percent of median. Overall, Colorado is currently utilizing 59 percent of total reservoir capacity state-wide compared to 63 percent storage this time last year (see <u>End of February Reservoir Storage Capacity chart</u>).

Streamflow



As of March 1st the 6-month (April through September) 50 percent exceedance volumetric streamflow forecast for the state of Colorado is at 88 percent of median with the cental to northeastern basins between 90 and 102 percent of median and the central to southwestern basins between 63 and 87 percent of median. The basins above median for the month of February this water year include the South Platte, Colorado Headwaters, the combined Yampa-White-Little Snake, Arkansas, and the combined Laramie and North Platte (102, 97, 94, 92, and 90 respectively). The basins below median this month are the Gunnison, the Upper Rio Grande, and the combined San Miguel-Dolores-Animas-San Juan (SMDASJ) (87, 75, 63 respectively). Because increased soil moisture enhances runoff efficiency in the spring, basins with improved soil moisture are better positioned to generate efficient snowmelt. In contrast, basins with drier soil moisture may absorb more meltwater before contributing to streamflow. Though many of the central to northeastern basins mentioned above show above median soil moister with Colorado Headwaters at 104 percent, Arkansas at 124 percent and the combined Yampa-White-Little Snake at 106; soil moisture in the South Platte and the combined Laramie and North Platte are below, to well below, median at 60 and 87 percent respectively which will hinder volumetric streamflow come melt out. Promisingly though for volumetric streamflow in the central to southwestern basins, again the Gunnison, the Upper Rio Grande, and the combined San Miguel-Dolores-Animas-San Juan), is their well above median soil moisture content at 163, 139, and 116 percent respectively. Storms throughout the state have continued boosting snowpack, however there are only a few weeks left for peak accumulation. Though NOAA's 8-14 day precipitation forecast puts Colorado state at near to slightly above normal (between 33 and 50 percent), Colorado's storm cycles this season remain variable and inconsistent and it is unclear whether streamflow will make enough future gains in the southern basins to approach or surpass median this water year.

GUNNISON RIVER BASIN

March 1st, 2025

Snowpack in the Gunnison River basin is below normal at 85 percent of median. Precipitation for February was 84 percent of median which brings water year-to-date precipitation to 86 percent of median. Reservoir storage at the end of February was 97 percent of median compared to 104 percent last year. Current streamflow forecasts range from 57 percent of median at Surface Creek at Cedaredge to 102 percent of median at both Tomichi Creek at Gunnison and Taylor River below Taylor Park Reservoir.



*Snow water equivalent (SWE) values are calculated using daily SNOTEL data only for the above graph. In the paragraph SWE is calculated for the first of the month using both SNOTEL and Snow Course data.



PRECIPITATION ACCUMULATION IN GUNNISON



Gunnison Reservoir Storage Summary for March 1st 2025



Watershed Snowpack Analysis March1st, 2025

	Gunnison Sub-Basin Snow Data			
	# of Sites	% Median	Last Year % Median	
Upper Gunnison	14.0	92.3	104.7	
North Fork Gunnison	3.0	78.2	86.3	
Uncompahgre Plateau	1.0	69.7	98.0	
Uncompahgre	3.0	92.5	88.4	
Surface-Kannah	3.0	68.5	86.9	

Reservoir Storage End of February 2025

	Gunnison Reservoir Data			
	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
Fruitgrowers Reservoir	2.04	2.3	3.6	56.7
Vouga Reservoir	0.06	0.06	0.75	8.0
Silverjack Reservoir	0.77	0.88	4.3	17.9
Fruitland Reservoir	nan	3.57	1.15	nan
Crawford Reservoir	5.94	6.95	6.3	94.3
Blue Mesa Reservoir	509.29	561.76	532.3	95.7
Crystal Reservoir	8.9	2.5	8.1	109.9
Morrow Point Reservoir	110.98	116.25	108.9	101.9
Taylor Park Reservoir	68.96	70.55	68.7	100.4
Paonia Reservoir	3.02	2.77	2.4	125.8
Ridgway Reservoir	70.05	65.5	68.3	102.6



COLORADO HEADWATERS RIVER BASIN

March 1st, 2025

Snowpack in the Colorado River basin is near normal at 101 percent of the median. Precipitation for February was 113 percent of median which brings water year-to-date precipitation to 95 percent of median. Reservoir storage at the end of February was 98 percent of median compared to 116 percent last year. Current streamflow forecasts range from 84 percent of median at Roaring Fork at Glenwood Springs to 109 percent of median at Blue River below Green Mountain Reservoir.



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PRECIPITATION ACCUMULATION IN COLORADO HEADWATERS



Colorado Headwaters Reservoir Storage Summary for March 1st 2025



Watershed Snowpack Analysis March 1st, 2025

	# of Sites	% Median	Last Year % Median
Headwaters Colorado	10.0	118.0	106.9
Roaring Fork	9.0	91.1	99.3
Colorado-Kremmling to Glenwood Springs	5.0	101.5	109.2
Eagle	7.0	100.0	96.9
Blue	8.0	117.9	105.0
Plateau	4.0	68.1	85.2
Williams Fork	4.0	107.3	101.8
Muddy	4.0	110.9	109.3
Willow	4.0	97.0	91.2
Troublesome	2.0	93.0	90.9

Colorado Headwaters Sub-Basin Snow Data

Reservoir Storage End of February 2025

	Colorado Headwaters Reservoir Data			
	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
Dillon Reservoir	197.45	209.99	216.8	91.1
Shadow Mountain Reservoir	16.49	16.42	17.3	95.3
Homestake Reservoir	42.28	34.99	35.9	117.8
Green Mountain Reservoir	57.52	68.5	64.9	88.6
Williams Fork Reservoir	70.38	79.33	71.8	98.0
Vega Reservoir	11.91	15.42	12.9	92.3
Wolford Mountain Reservoir	53.24	52.92	48.1	110.7
Ruedi Reservoir	72.68	73.11	68.6	105.9
Willow Creek Reservoir	6.59	5.05	7.1	92.8
Lake Granby	290.45	413.25	288.4	100.7



SOUTH PLATTE RIVER BASIN

March 1st, 2025

Snowpack in the South Platte River basin is above normal at 105 percent of median. Precipitation for February was 113 percent of median which brings water year-to-date precipitation to 100 percent of median. Reservoir storage at the end of February was 101 percent of median compared to 101 percent last year. Current streamflow forecasts are at 88 percent of median and range from 78 percent of median at South Platte River below Antero Reservoir to 110 percent of median at Cache La Poudre at Canyon Mouth.



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PRECIPITATION ACCUMULATION IN SOUTH PLATTE



South Platte Reservoir Storage Summary for March 1st 2025



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Watershed Snowpack Analysis March 1st, 2025

	South Platte Sub-Basin Snow Data			
	# of Sites	% Median	Last Year % Median	
Upper South Platte	15.0	97.3	103.9	
North Fork Cache La Poudre	4.0	95.3	84.6	
Cache La Poudre	12.0	109.6	90.0	
Big Thompson	7.0	106.2	90.1	
Clear	5.0	114.1	99.0	
Boulder	6.0	111.9	89.1	
Saint Vrain	5.0	100.2	89.6	

South Platte Reservoir Storage End of February 2025

	South Platte Reservoir Data			
	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
Gross Reservoir	16.83	16.88	13.7	122.8
Elevenmile Canyon Reservoir	99.97	99.35	99.3	100.7
Spinney Mountain Reservoir	19.96	40.54	29.9	66.8
Black Hollow Reservoir	2.87	3.59	3.1	92.6
Marshall Reservoir	5.79	7.63	6.2	93.4
Cobb Lake	16.89	19.27	14.3	118.1
Carter Lake	93.9	73.46	90.5	103.8
Marston Reservoir	9.51	9.01	6.7	141.9
Boyd Lake	28.21	39.45	30.9	91.3
Cheesman Lake	72.73	65.58	64.5	112.8
Halligan Reservoir	4.46	5.78	5.3	84.2
Ralph Price Reservoir	11.93	13.89	13.3	89.7
Horsetooth Reservoir	137.56	100.06	115.1	119.5
Chambers Lake	3.59	4.24	3.5	102.6
Lone Tree Reservoir	6.14	6.89	6.9	89.0
Terry Reservoir	5.11	6.15	5.4	94.6
Antero Reservoir	18.82	20.44	19.5	96.5
Mariano Reservoir	2.5	3.99	3.4	73.5
Windsor Reservoir	8.4	13.92	12.5	67.2
Cache La Poudre	6.17	9.12	8.2	75.2
Lake Loveland Reservoir	1.78	7.39	7.4	24.1
Fossil Creek Reservoir	8.57	9.47	9.2	93.2
Union Reservoir	6.46	9.74	10.7	60.4

Eastern South Platte Reservoir Storage End of February 2025

	Eastern South Platte Reservoir Data			
	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
Riverside Reservoir	50.54	53.79	49.8	101.5
Empire Reservoir	26.97	27.43	29.6	91.1
Point Of Rocks Reservoir	62.85	69.44	65.5	96.0
Horsecreek Reservoir	2.32	9.89	13.3	17.4
Milton Reservoir	21.11	19.95	18.7	112.9
Standley Reservoir	33.79	37.83	37.2	90.8
Prewitt Reservoir	23.79	24.6	21.4	111.2
Jackson Lake Reservoir	22.64	25.3	23.9	94.7
Julesburg Reservoir	13.33	15.91	16.3	81.8
Barr Lake	23.43	28.25	26.6	88.1

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YAMPA-WHITE-LITTLE SNAKE AND LARAMIE-NORTH PLATTE RIVER BASINS

March 1st, 2025

Snowpack in the Yampa-White-Little Snake and the Laramie-North Platte River basins are near normal at 96 percent and 102 percent of the median. Precipitation for February was 123 percent and 130 percent of median and water year-todate precipitation is 98 percent and 103 percent of median, respectively. Reservoir storage at the end of February for the Yampa-White-Little Snake was 102 percent of median compared to 105 percent last year. Current streamflow forecasts range from 81 percent of median at Little Snake River near Dixon to 104 percent of median at Yampa River above Stagecoach Reservoir.



Figure 1*Snow water equivalent (SWE) values are calculated using daily SNOTEL data only for the above graph. In the paragraph SWE is calculated for the first of the month using both SNOTEL and Snow Course data.

PRECIPITATION ACCUMULATION IN YAMPA-WHITE-LITTLE SNAKE



PRECIPITATION ACCUMULATION IN LARAMIE AND NORTH PLATTE





Yampa-White-Little Snake Reservoir Storage Summary for March 1st 2025



*No reservoirs are currently monitored in the Laramie-North Platte combined basin.

Watershed Snowpack Analysis March 1st, 2025

	# of Sites	% Median	Last Year % Median
Yampa	10.0	104.5	107.0
Little Snake	10.0	93.7	106.5
White	4.0	85.6	95.6
Williams Fork of the Yampa	1.0	91.3	97.1
Elk	2.0	88.9	97.1

Yampa-White-Little Snake Sub-Basin Snow Data

Laramie and North Platte Sub-Basin Snow Data

	# of Sites	% Median	Last Year % Median
North Platte Headwaters	14.0	101.8	98.1
Laramie	5.0	102.1	89.2

Reservoir Storage End of February 2025

Yampa-White-Little Snake Reservoir Data

	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
Elkhead Reservoir	18.7	18.36	19.6	95.4
High Savery Reservoir	11.77	nan	11.5	102.3
Yamcolo Reservoir	8.2	7.9	7.0	117.1
Stagecoach Reservoir nr Oak Creek	31.56	31.12	27.8	113.5

*No reservoirs are currently monitored in our database for the Laramie-North Platte combined basin.



ARKANSAS RIVER BASIN

March 1st, 2025

Snowpack in the Arkansas River basin is below normal at 79 percent of median. Precipitation for February was 66 percent of median which brings water year-to-date precipitation to 98 percent of median. Reservoir storage at the end of February was 113 percent of median compared to 112 percent last year. Current streamflow forecasts range from 48 percent of median at Huerfano River near Redwing to 105 percent of median at Chalk Creek near Nathrop.



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PRECIPITATION ACCUMULATION IN ARKANSAS



Arkansas Reservoir Storage Summary for March 1st 2025



Watershed Snowpack Analysis March 1st, 2025

	Arkansas Sub-Basin Snow Data				
	# of Sites	% Median	Last Year % Median		
Cucharas & Huerfano	5.0	50.3	81.9		
Upper Arkansas Headwaters	9.0	95.7	102.4		
Lower Arkansas Headwaters	3.0	71.5	87.2		
Purgatoire	3.0	45.6	88.4		
Apishapa	2.0	46.5	96.1		

Arkansas Reservoir Storage End of February 2025

	Arkansas Reservoir Data			
	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
Clear Creek Reservoir	8.44	7.78	8.1	104.2
Trinidad Lake	22.58	21.26	20.8	108.6
Pueblo Reservoir	253.72	249.89	221.8	114.4
Lake Henry	8.11	9.55	7.3	111.1
Turquoise Lake	72.67	77.16	66.5	109.3
Twin Lakes Reservoir	45.89	39.64	38.7	118.6
Meredith Reservoir	40.9	42.5	36.2	113.0

Eastern Arkansas Reservoir Storage End of February 2025

	Eastern Arkansas Reservoir Data			
	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
John Martin Reservoir	60.92	50.22	69.8	87.3
Adobe Creek Reservoir	53.65	42.51	46.0	116.6
Holbrook Lake	6.19	1.03	4.3	144.0
Horse Creek Reservoir	nan	nan	0.5	nan



UPPER RIO GRANDE RIVER BASIN

March 1st, 2025

Snowpack in the Upper Rio Grande River basin is below normal at 62 percent of median. Precipitation for February was 50 percent of median which brings water year-to-date precipitation to 78 percent of median. Reservoir storage at the end of February was 121 percent of median compared to 119 percent last year. Current streamflow forecasts range from 29 percent of median at San Antonio River at Ortiz to 89 percent of median at Rio Grande at Wagon Wheel Gap.



*Snow water equivalent (SWE) values are calculated using daily SNOTEL data only for the above graph. In the paragraph SWE is calculated for the first of the month using both SNOTEL and Snow Course data.











Watershed Snowpack Analysis March 1st, 2025

Upper Rio Grande Sub-Basin Snow Data

	# of Sites	% Median	Last Year % Median
Sagauche	3.0	89.6	90.1
Costilla	2.0	31.7	95.0
Headwaters Rio Grande	7.0	69.2	86.6
Northern San Luis Valley	2.0	54.9	69.8
Conejos & Rio San Antonio	4.0	51.5	82.5
Culebra & Trinchera	4.0	69.8	82.7
Alamosa	2.0	42.2	83.7

Reservoir Storage End of February 2025

	Upper Rio Grande Reservoir Data			
	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
Sanchez Reservoir	5.75	6.83	19.6	29.3
Platoro Reservoir	30.46	32.48	17.3	176.1
Beaver Reservoir	3.82	3.89	4.2	91.0
Terrace Reservoir	6.14	6.38	6.0	102.3
La Jara Reservoir	1.86	2.13	2.1	88.6
Costilla Reservoir	3.53	4.89	6.4	55.2
Rio Grande Reservoir	28.2	23.71	18.3	154.1
Continental Reservoir	15.18	13.24	4.6	330.0
Santa Maria Reservoir	9.15	9.52	7.9	115.8
Mountain Home Reservoir	3.82	2.5	2.5	152.8



SAN MIGUEL-DOLORES-ANIMAS-SAN JUAN COMBINED RIVER BASIN

March 1st, 2025

Snowpack in the combined southwest river basins is below normal at 64 percent of median. Precipitation for February was percent 61 of median which brings water year-to-date precipitation to 74 percent of median. Reservoir storage at the end of February was 80 percent of median compared to 87 percent last year. Current streamflow forecasts range from 49 percent of median at San Juan River near Carracas to 80 percent of median at Animas River at Durango.



*Snow water equivalent (SWE) values are calculated using daily SNOTEL data only for the above graph. In the paragraph SWE is calculated for the first of the month using both SNOTEL and Snow Course data.



PRECIPITATION ACCUMULATION IN SAN MIGUEL-DOLORES-ANIMAS-SAN JUAN



San Miguel-Dolores-Animas-San Juan Reservoir Storage Summary for March 1st 2025



Watershed Snowpack Analysis March 1st, 2025

San Miguel-Dolores-Animas-San Juan Sub-Basin Snow Data

	# of Sites	% Median	Last Year % Median
Animas	9.0	69.5	88.6
Upper San Juan	6.0	58.3	90.2
San Miguel	6.0	77.8	90.1
Dolores	4.0	72.7	99.0
Mancos-La Plata	3.0	57.1	88.5

Reservoir Storage End of February 2025

	San Miguel-Dolores-Animas-San Juan Reservoir Data			
	Current Storage (KAF)	LY Storage (KAF)	Median (KAF)	Percent of Median
Groundhog Reservoir	12.48	12.95	14.2	87.9
Vallecito Reservoir	85.8	66.68	73.5	116.7
Mcphee Reservoir	209.4	292.14	273.8	76.5
Navajo Reservoir	1027.99	1078.73	1311.0	78.4
Jackson Gulch Reservoir	4.84	4.6	4.1	118.0
Trout Lake Reservoir	1.05	2.5	1.82	57.7
Lemon Reservoir	22.82	15.74	18.8	121.4



New 1991-2020 Statistical Normals

The NRCS Snow Survey and Water Supply Forecasting (SSWSF) Program recently published new statistical normals (medians or averages) to describe the central tendency of a data record over a 30-year period. Data normals are key in helping water users compare current conditions to past conditions using the metric "% of normal." Every 10 years, the SSWSF Program updates the 30-year normals reference period to stay consistent with World Meteorological Organization standards that account for changing climatic conditions over time. As such, this year the SSWSF Program transitioned from using 1981-2010 data normals to using 1991-2020 data normals.

For the 1991-2020 reference period, the median is the official NRCS normal when conveying information about current snowpack, precipitation, and water supply conditions. The median was previously used as the official 1981-2010 normal for SWE and some streamflow forecast points, but the average was used for other data types. Setting the official normal to the median provides consistency across data types and stations. Viewing the 30-year average December be preferable over the median in some instances, therefore, both the average and the median are available in most NRCS reports and products. See Median vs. Average for more information about the median.

A new suite of statistics for automated snow monitoring stations are available to provide information about normal seasonal snowpack characteristics. These new seasonal statistics include medians and averages for the SWE onset date and melt-out date, as well as the median and average maximum seasonal SWE value (Peak SWE) and date of Peak SWE. More detailed information on the updated normals can be found on the Water and Climate Center's <u>30-year normals page</u>.



How to Read Snowpack Graphs

The graphs show snow water equivalent (SWE) (in inches), using daily SNOTEL data. for the October 1 through September 30 water year. Basin "observed" SWE values are computed using SNOTEL sites which are characteristic of the snowpack of the particular basin.

Current water year is represented by the heavy red line terminating on the last day the graphic was updated.

Historical observed percentile range is shown as a gray background area on the graph. Shades of gray indicate maximum, 90 percentile, 70 percentile, 50 percentile (solid black line), 30 percentile, 10 percentile, and minimum for the period of record.

50 % Exceedance Projection: The most probabilistic snowpack projection, based on the median snowpack is projected forward from the end of the current period to the end of the current water year.

For more detailed information on these graphs visit:

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_062291.pdf



How Forecasts Are Made

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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 snow courses 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. 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 December 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 December 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.

Interpreting the Forecast Graphics

These graphics provide a new way to visualize the range of streamflows represented by the forecast exceedance probabilities for each forecast period. The colors in the bar for each forecast point indicate the exceedance probability of the forecasts and the vertical lines on the bar signify the five published forecast exceedance probabilities. The numbers displayed above the color scale represent the actual forecasted streamflow volume (in KAF) for the given exceedance probability. The horizontal axis provides the percent of median represented by each forecast and the gray line centered above 100% represents the 1981-2010 historical median streamflow. The position of the gray line relative to the color scale provides a benchmark for considering future streamflows. If the majority of the forecast period. Conversely, if the majority of the color bar is to the left of the median mark, below median volumes are more likely. The horizontal span of the forecasts offers an indication of the uncertainty in a given forecast: when the bar spans a large horizontal range, the forecast skill is low and uncertainty is high; when the bar is narrow in width, the forecast skill is higher and uncertainty lower.





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In addition to the water supply outlook reports, water supply forecast information for the Western United States is available from the Natural Resources Conservation Service and the National Weather Service monthly, February through June. The information December be obtained from the Natural Resources Conservation Service web page at http://www.wcc.nrcs.usda.gov/wsf/westwide.html

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