United States Department of Agriculture

Natural Resources Conservation Service

Arizona Basin Outlook Report February 15, 2023

Issued by

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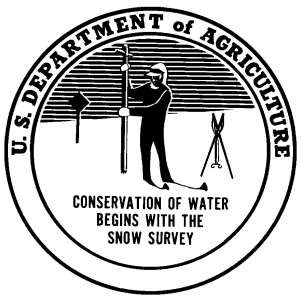
Basin Outlook Reports
And Federal – State – Private Cooperative Snow Surveys

How forecasts are made

Most of the annual streamflow in Arizona 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 Snow Telemetry (SNOTEL) sites, along with precipitation and streamflow values, are used in statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service (NRCS) the National Weather Service, and the Salt River Project.

Forecasts of any kind are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertainty 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 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 are concerned about having an adequate water supply, they may want to base their decisions on the 90% or 70% exceedance probability forecasts. On the other hand, if users anticipate receiving too much water, or are concerned about the threat of flooding, they may want to base their decisions on the 30% or 10% exceedance probability forecasts. Regardless of the forecast value users choose, they should be prepared to deal with either more or less water.



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ARIZONA Basin Outlook Report
as of February 15, 2023

SUMMARY

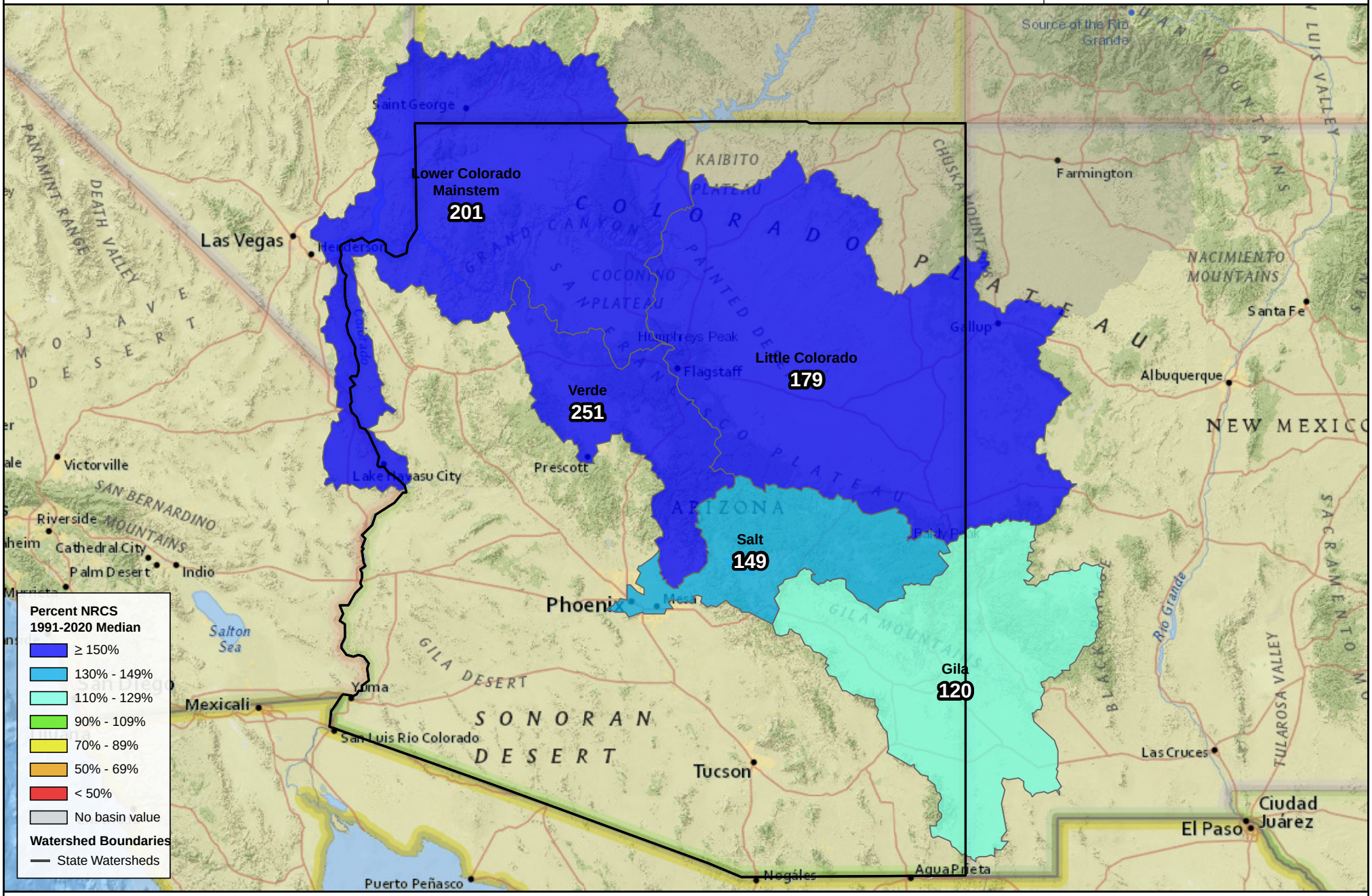
As of February 15, snow water equivalent levels in the state's major river basins are above median to well above median, ranging from 120 percent of median in the Gila River Basin, to 251 percent of median in the Verde River Basin.

Mountain data from NRCS SNOTEL sites and NWS Cooperator gages show that precipitation for the first half of February was above median to well above median in the major river basins. Cumulative precipitation since October 1 is well above median throughout the basins. Please refer to the precipitation graphs found in this report for more information on precipitation levels in the basins.

The Salt and Verde River reservoir system stands at 79 percent of capacity. San Carlos Reservoir is currently at 43 percent of capacity.

The streamflow forecasts call for well above median streamflow for the spring runoff period, ranging from 197 percent of median in the Salt River Basin to 293 percent of median in the Verde River Basin. Please refer to the basin forecast tables found in this report for more information regarding water supply forecasts.

Snow Water Equivalent	Arizona Major Basin Percent NRCS 1991-2020 Median	Middle of February, 2023



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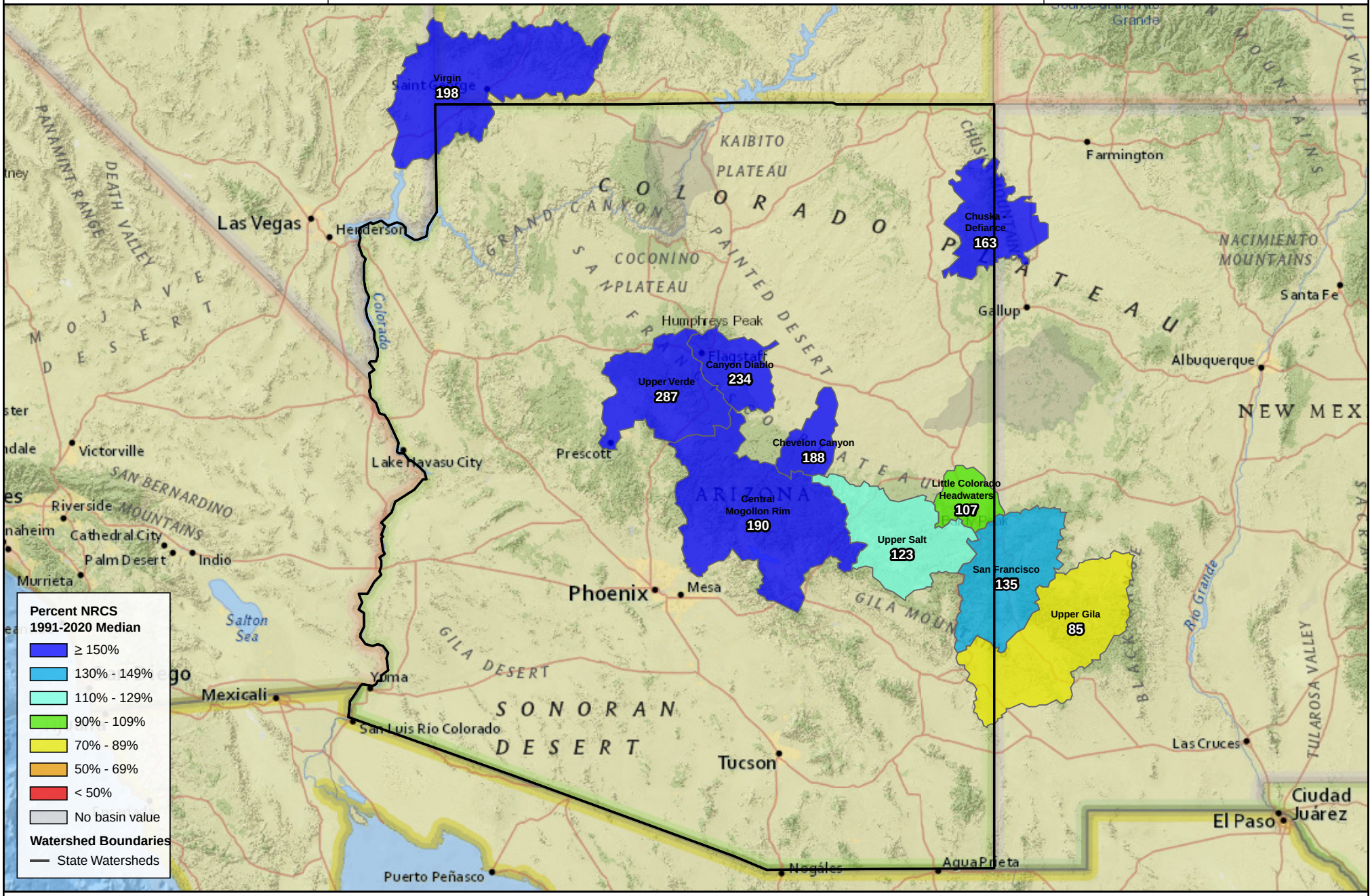
Snow Water Equivalent	Arizona Subbasin Percent NRCS 1991-2020 Median	Middle of February, 2023



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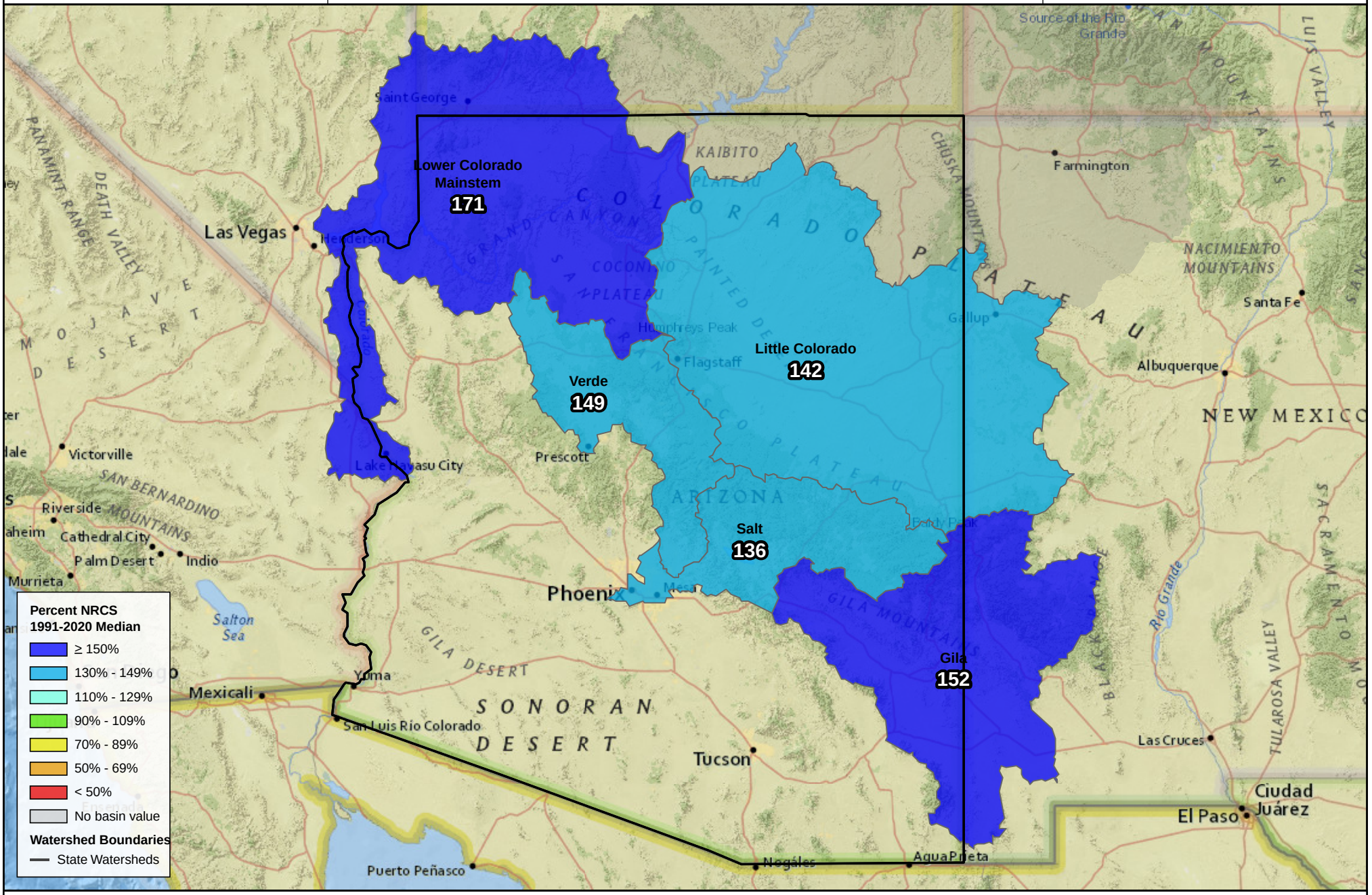
Water Year to Date Precipitation	Arizona Major Basin Percent NRCS 1991-2020 Median	October 1, 2022 - February 15, 2023



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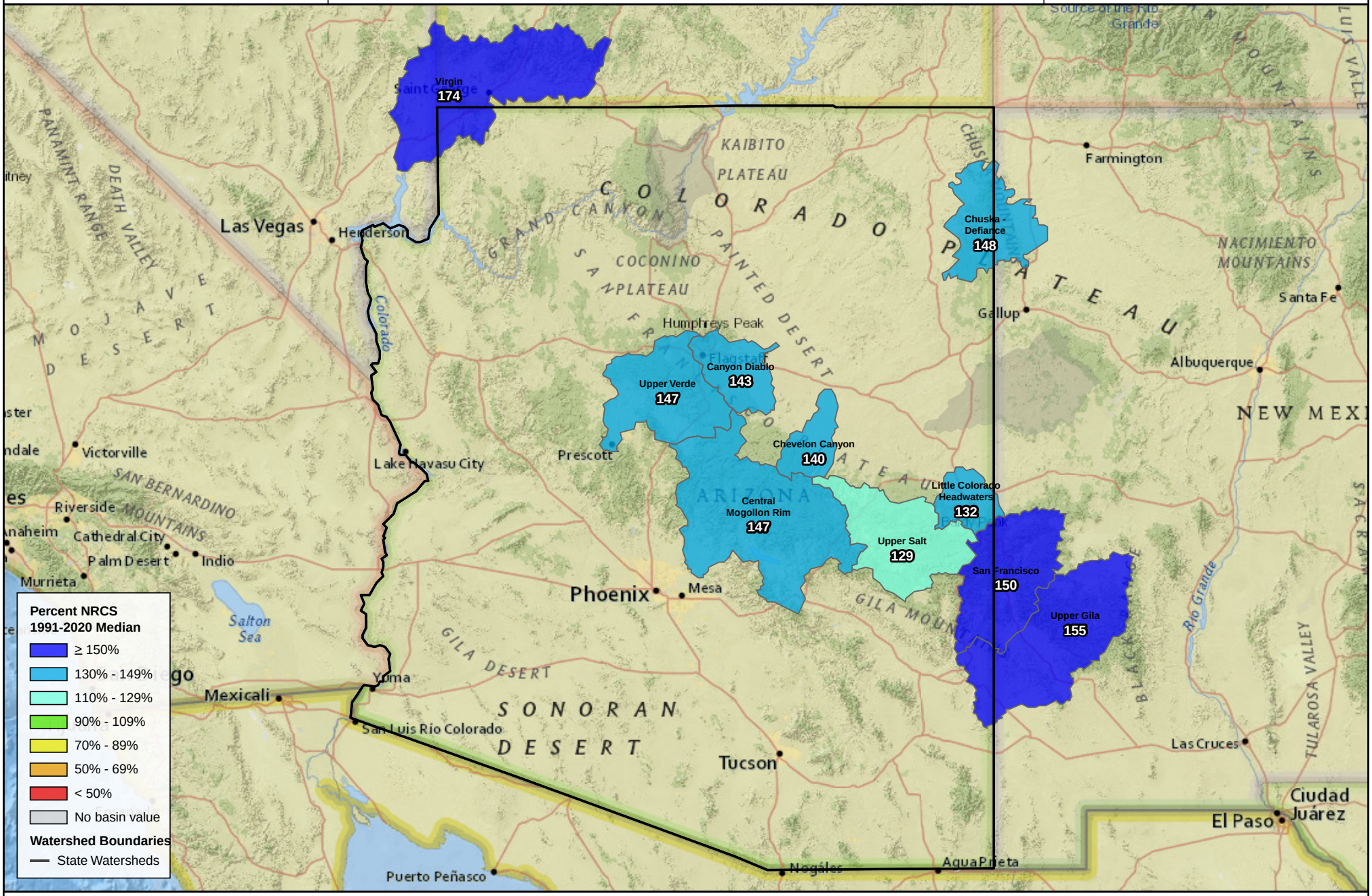
Water Year to Date Precipitation	Arizona Subbasin Percent NRCS 1991-2020 Median	October 1, 2022 - February 15, 2023



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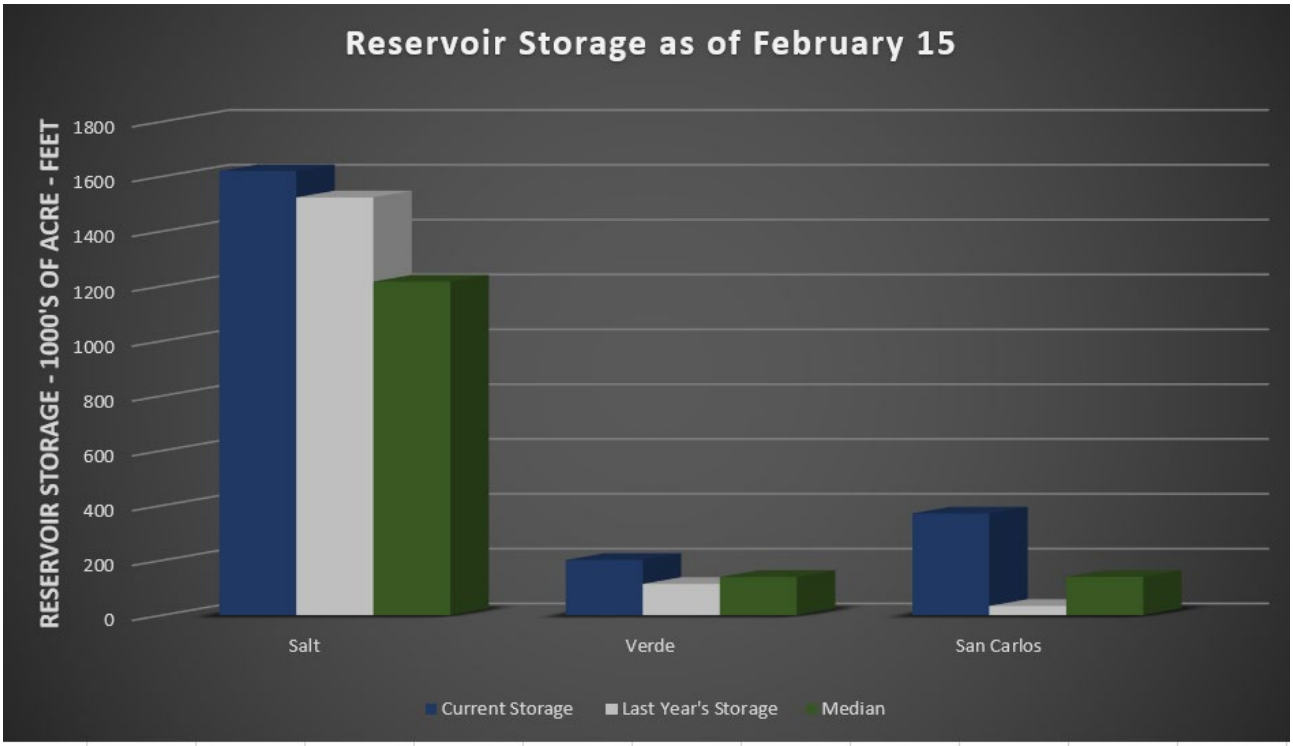
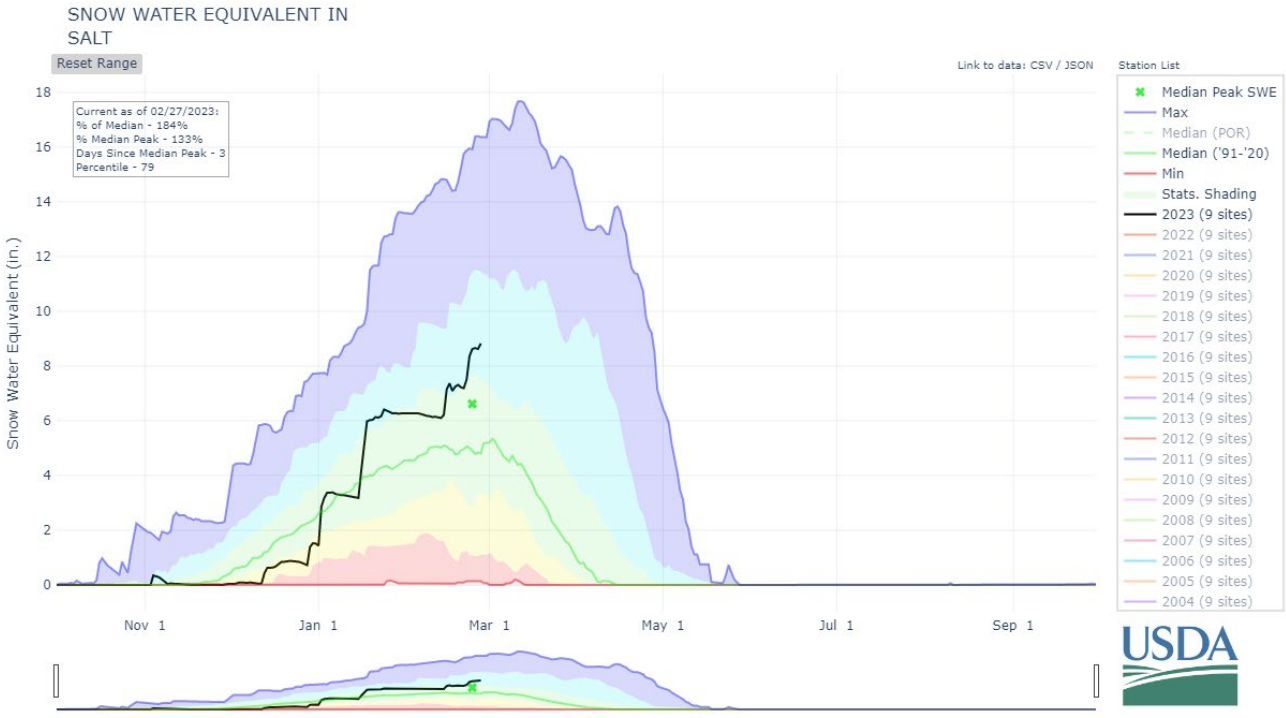


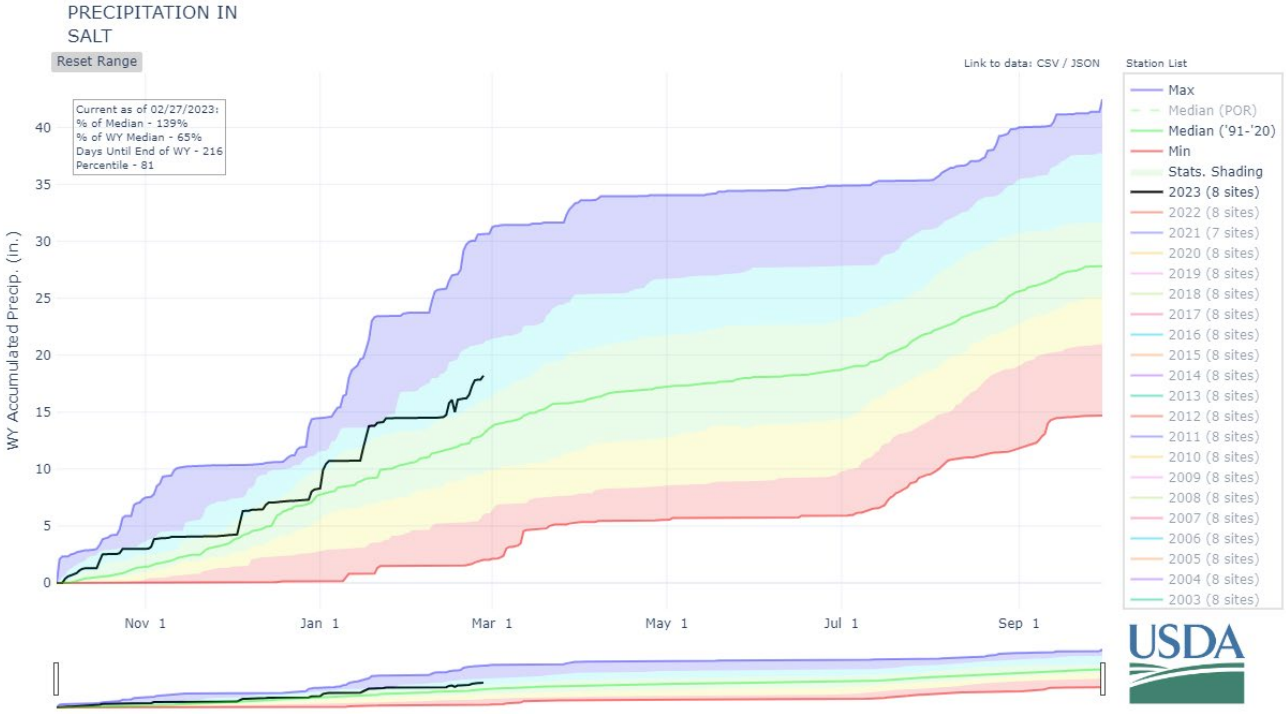
Key storage volumes displayed in thousands of acre-feet (x1000):

Reservoir	**Current Storage**	**Last Year Storage**	**30-Year Median**	**Storage Capacity**
Salt River System	1620.0	1523.9	1217.0	2025.8
Verde River System	201.8	114.3	139.7	287.4
San Carlos Reservoir	371.5	34.0	140.2	875.0
Lyman Lake	7.3	4.8	8.0	30.0
Lake Havasu	569.2	551.7	564.2	619.0
Lake Mohave	1680.1	1667.5	1671.0	1810.0
Lake Mead	7508.0	8978.0	15384.0	26159.0
Lake Powell	5380.0	6177.0	13256	24322.0

SALT RIVER BASIN as of February 15, 2023

Well above median streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 140% of median streamflow through May, while at Tonto Creek, the forecast calls for 140% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 149% of median.





Snow Water Equivalent	Salt River Basin Percent NRCS 1991-2020 Median	Middle of February, 2023

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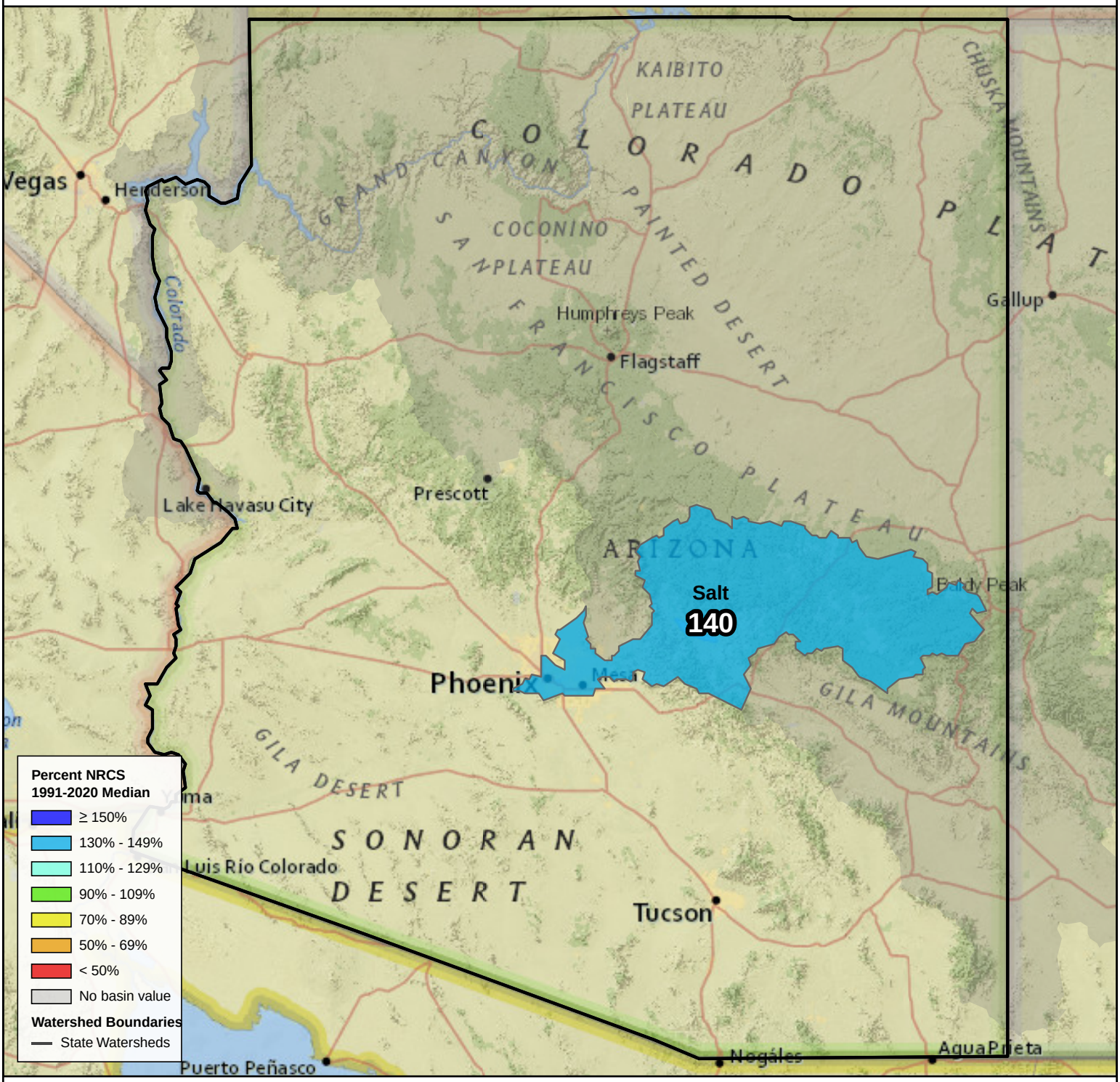
Forecast Volume, 50% Exceedance Probability	Salt River Basin Percent NRCS 1991-2020 Median	Primary Period, February 16, 2023



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Salt
Streamflow Forecasts - February 16, 2023

Salt	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						
Tonto Ck ab Gun Ck nr Roosevelt[3]								
	FEB	0.36	2.2	5	78%	9.4	19.8	6.4
	F15-MAY	7.3	20	35	140%	55	98	25
Salt R nr Roosevelt[3]								
	FEB	10.6	25	40	111%	60	100	36
	MAR-MAY	128	199	260	145%	330	460	179
	F15-MAY	142	215	280	140%	355	485	200

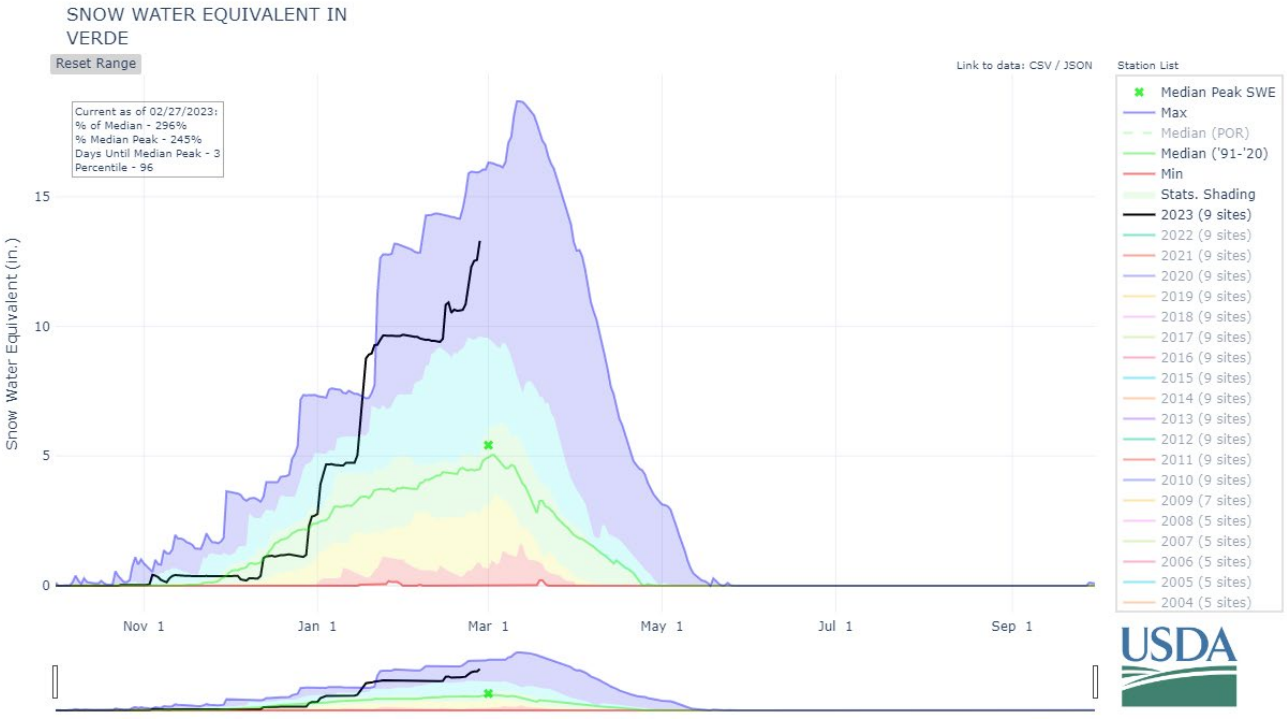
1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

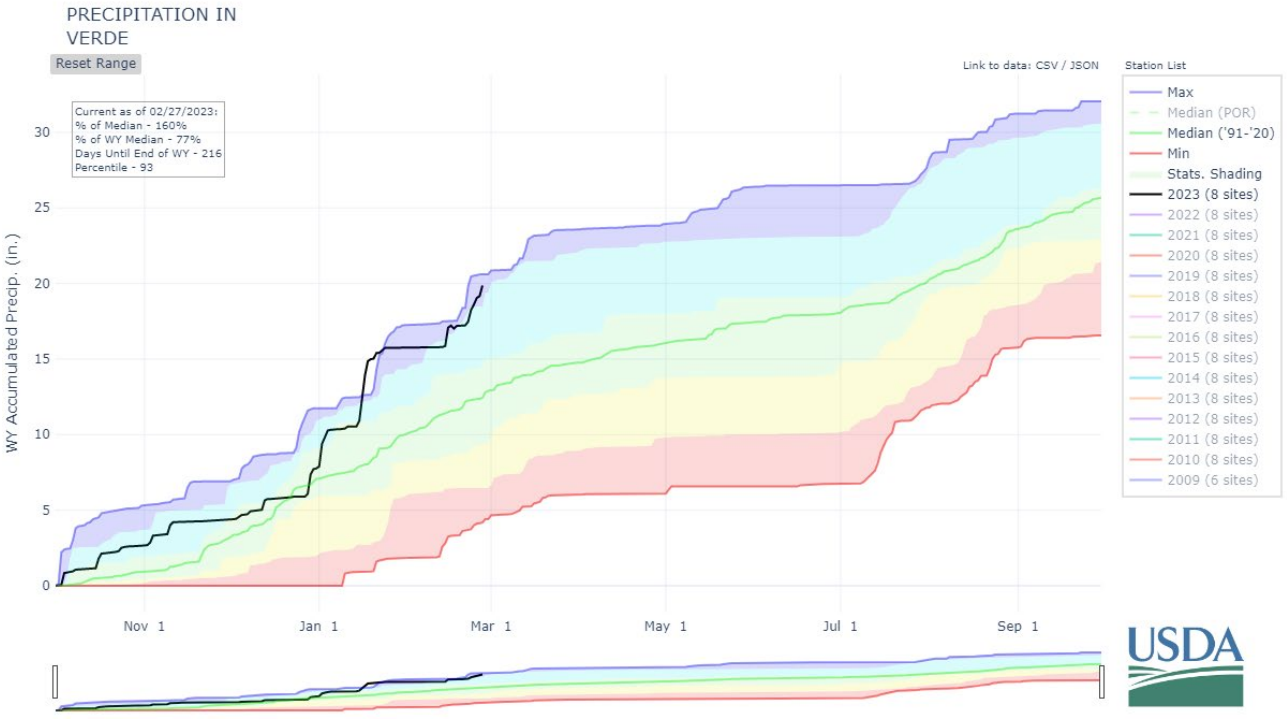
Reservoir Storage **Middle of January, 2023**	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Salt River Reservoir System		1523.9	1217.0	2025.8

Watershed Snowpack Analysis **February 16, 2023**	# of Sites	% Median	Last Year % Median
Salt	9	149%	56%

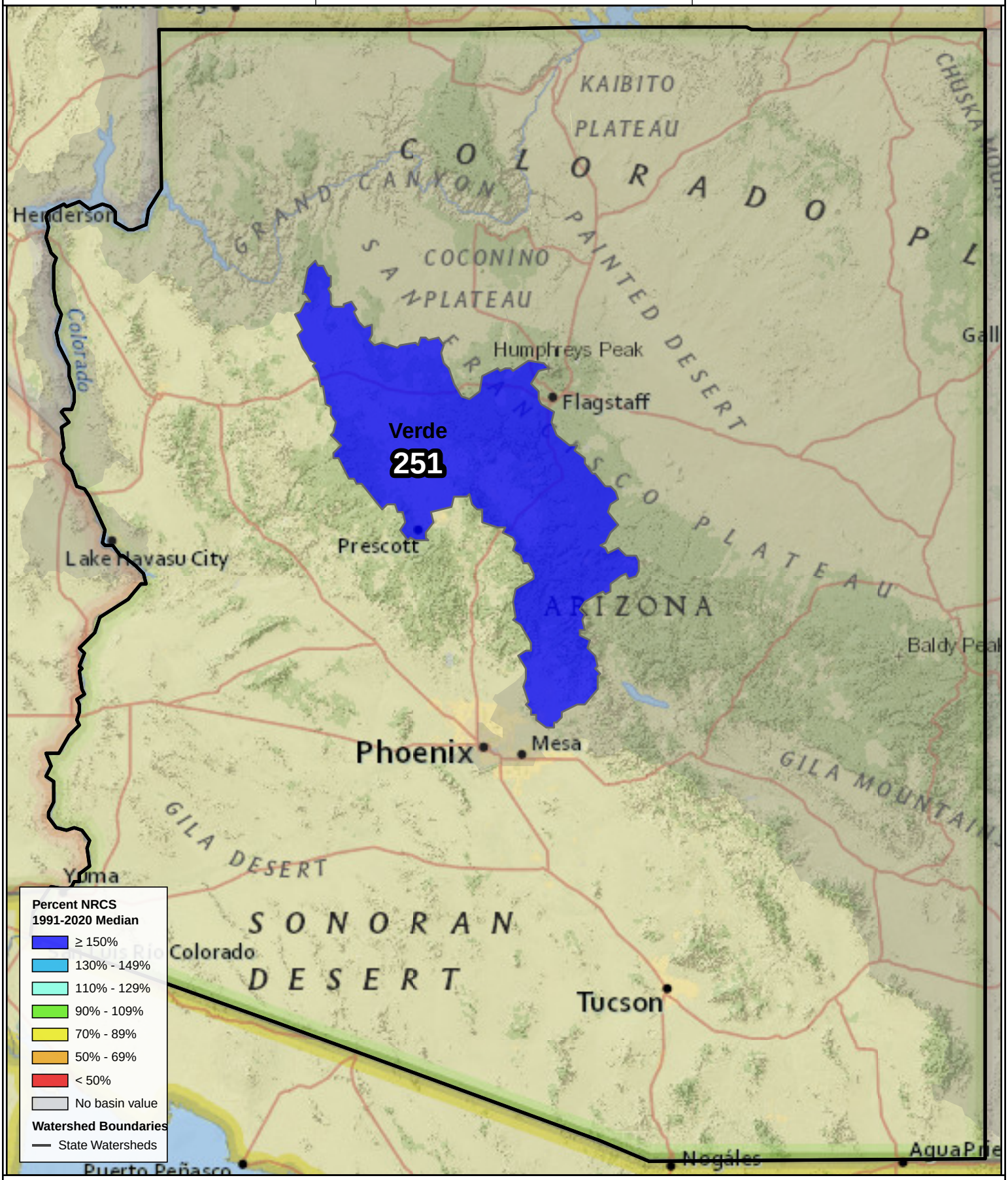
VERDE RIVER BASIN as of February 15, 2023

Well above median streamflow levels are forecast for the basin. In the Verde River above Horseshoe Dam, the forecast calls for 234% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 251% of median.





Snow Water Equivalent	Verde River Basin Percent NRCS 1991-2020 Median	Middle of February, 2023



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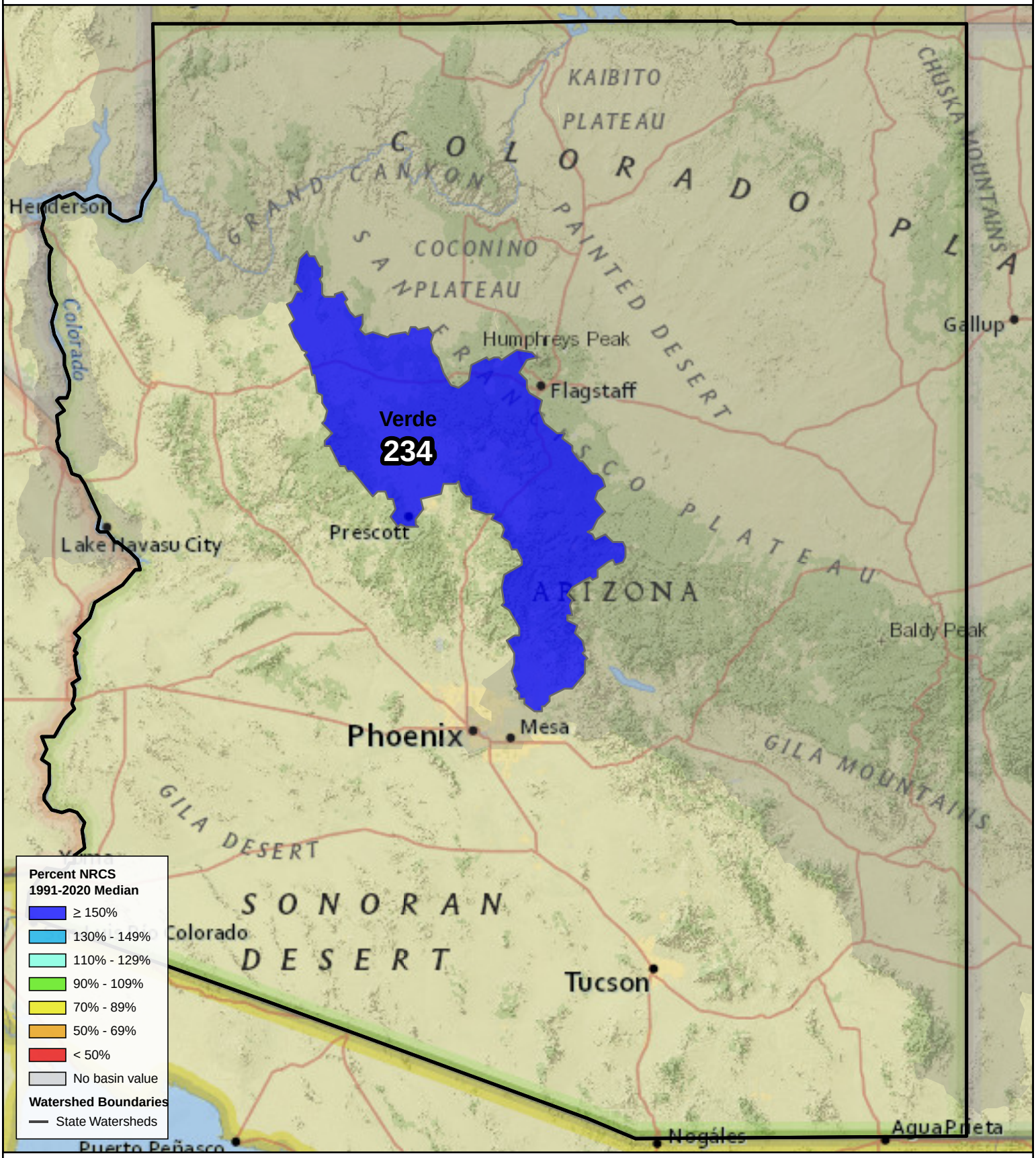
Forecast Volume, 50% Exceedance Probability	Verde River Basin Percent NRCS 1991-2020 Median	Primary Period, February 16, 2023



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Verde
Streamflow Forecasts - February 16, 2023

Verde	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						
Verde R bl Tangle Ck ab Horseshoe Dam								
	FEB	14.3	32	50	185%	74	121	27
	F15-MAY	104	168	225	234%	295	415	96

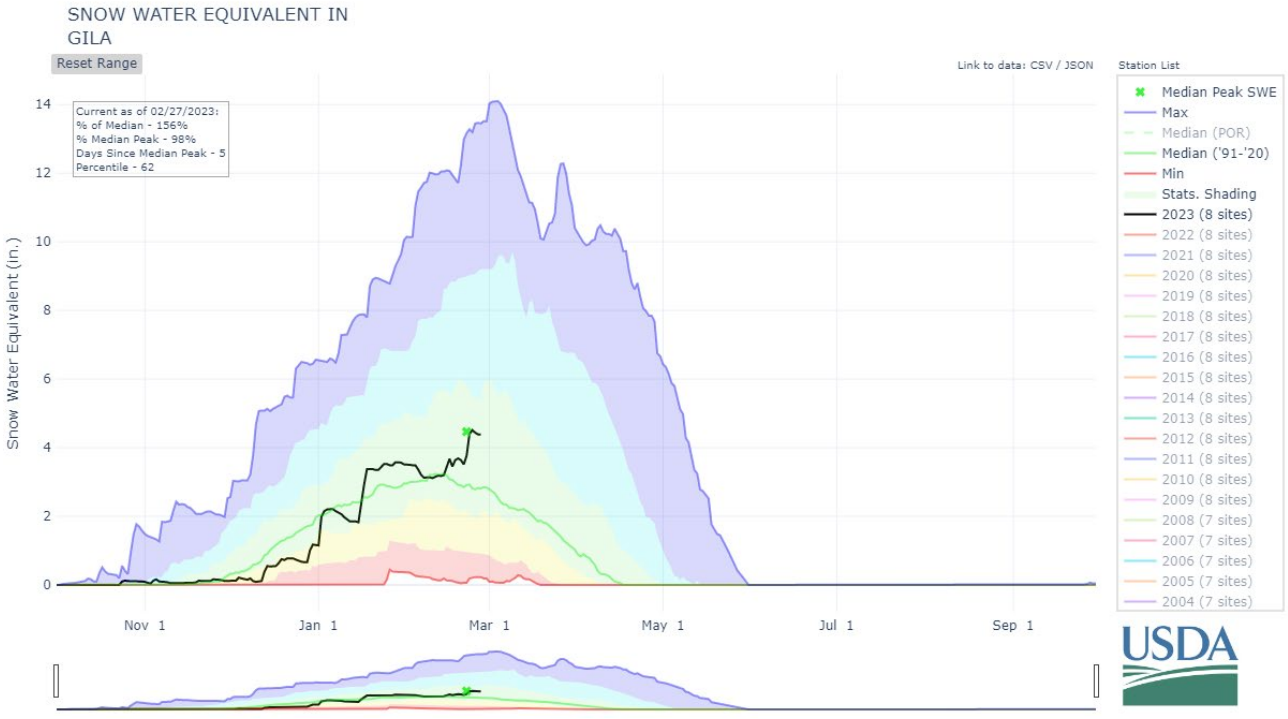
1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

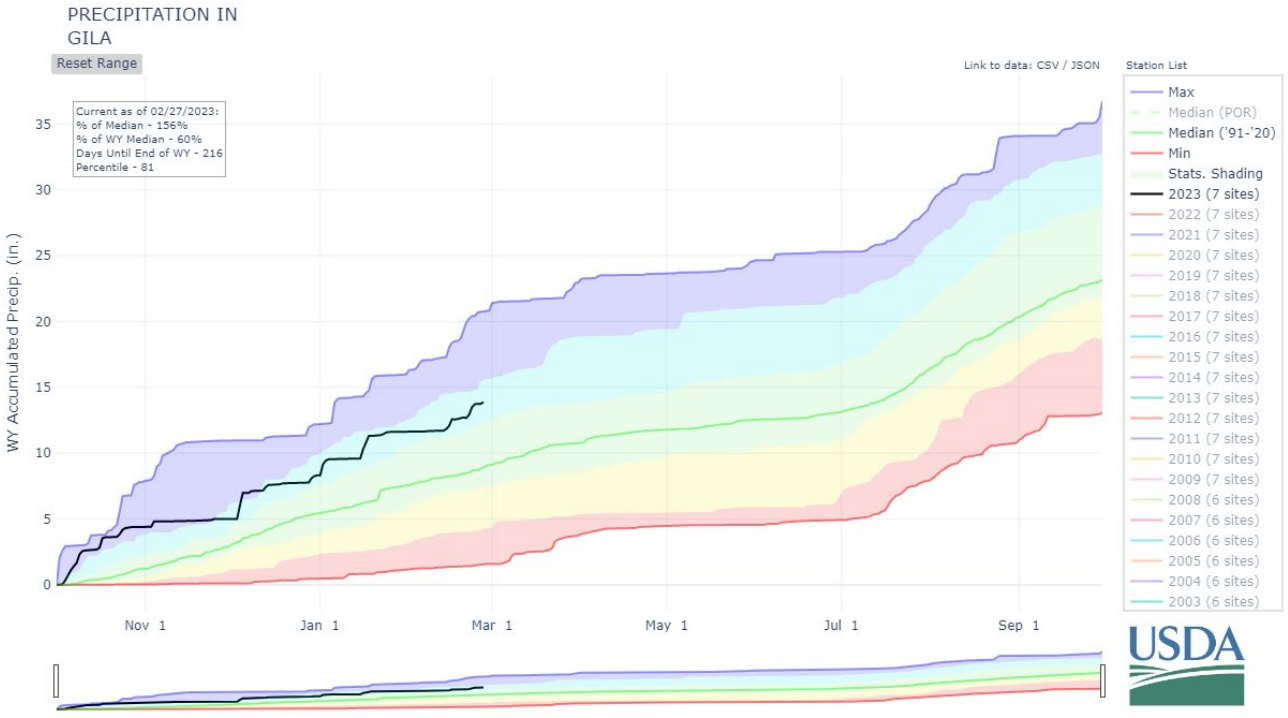
Reservoir Storage **Middle of January, 2023**	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Verde River Reservoir System		114.3	139.7	287.4

Watershed Snowpack Analysis **February 16, 2023**	# of Sites	% Median	Last Year % Median
Verde	9	251%	74%

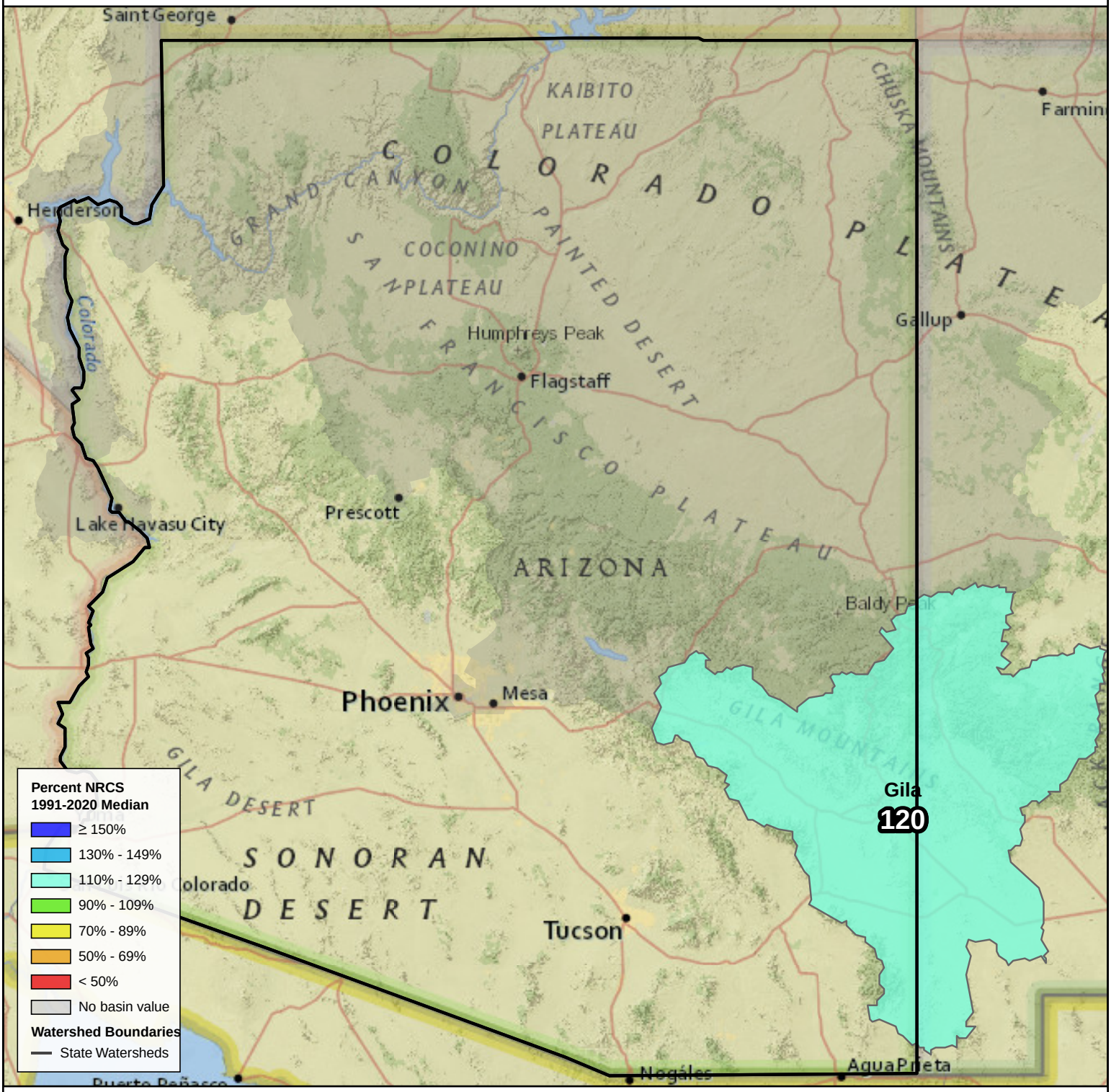
SAN FRANCISCO-UPPER GILA RIVER BASIN as of February 15, 2023

Well above median streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 275% of median streamflow levels through May. In the Gila River, near Solomon, the forecast calls for 199% of median streamflow levels through May. At San Carlos Reservoir, inflow to the lake is forecast at 236% of median through May. Snow survey measurements show the snowpack for this basin to be at 120% of median.





Snow Water Equivalent	Gila River Basin Percent NRCS 1991-2020 Median	Middle of February, 2023



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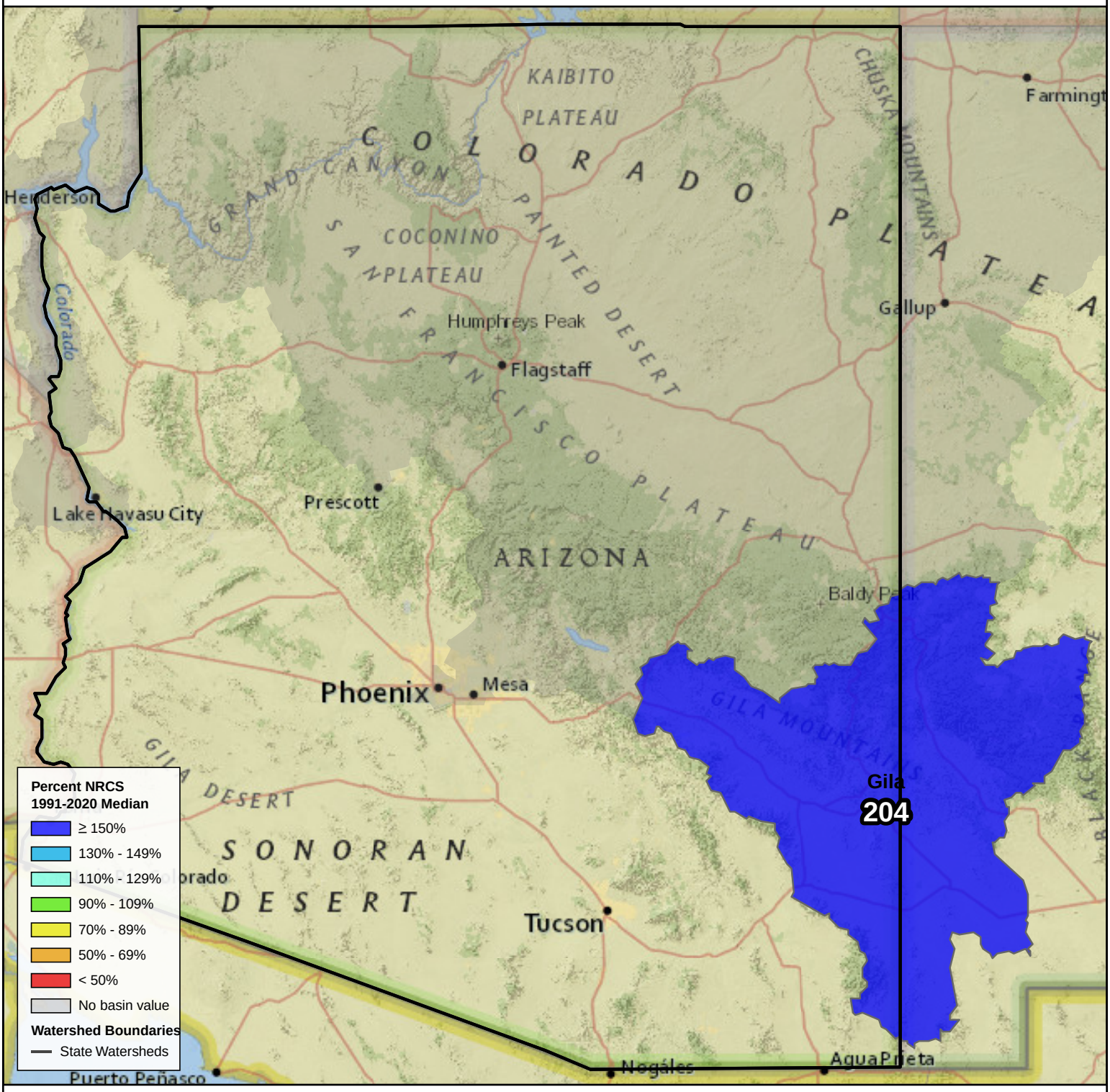
Forecast Volume, 50% Exceedance Probability	Gila River Basin Percent NRCS 1991-2020 Median	Primary Period, February 16, 2023



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San Francisco - Upper Gila
Streamflow Forecasts - February 16, 2023

San Francisco - Upper Gila	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)
Gila R at Gila[3]								
	F15-MAY	25	37	46	135%	57	76	34
San Carlos Reservoir Inflow[3]								
	F15-MAY	29	67	106	236%	158	260	45
Gila R bl Blue Ck nr Virden[3]								
	F15-MAY	31	47	62	163%	78	107	38
San Francisco R at Glenwood[3]								
	F15-MAY	14.7	24	32	254%	41	59	12.6
Gila R nr Solomon[3]								
	FEB	13	29	45	214%	66	108	21
	F15-MAY	71	111	145	199%	185	255	73
San Francisco R at Clifton[3]								
	F15-MAY	46	69	88	275%	111	151	32

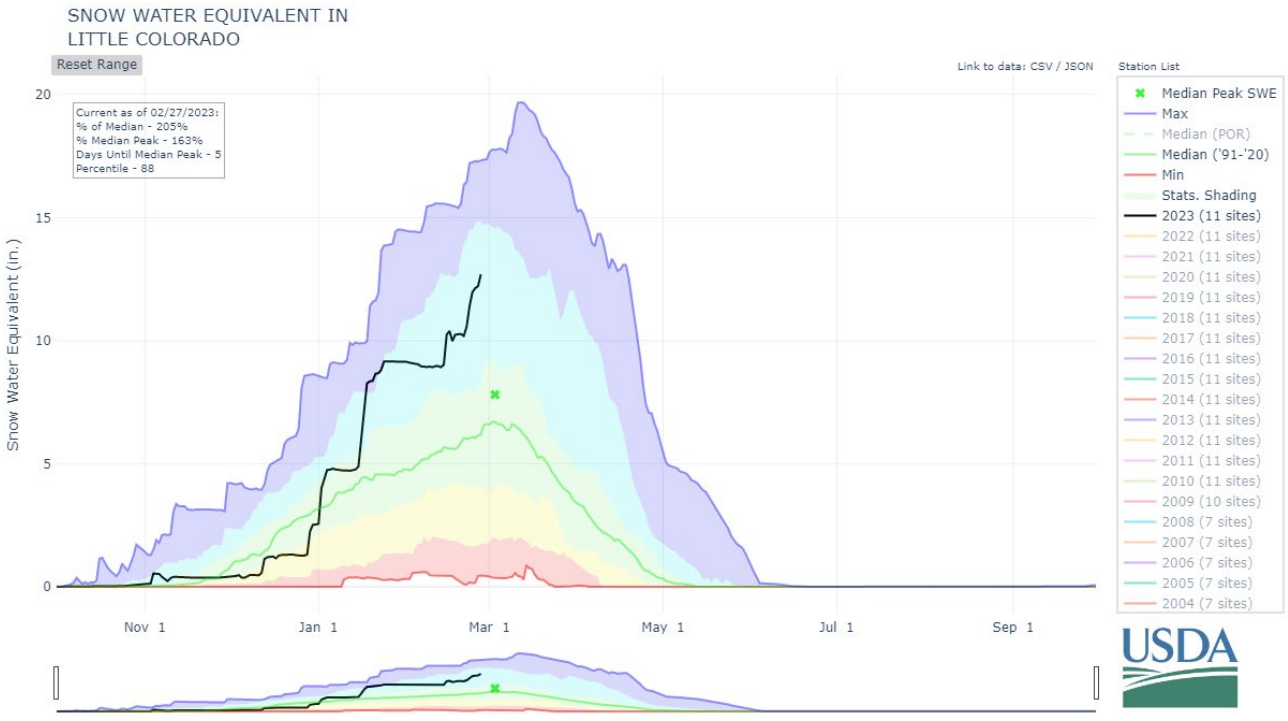
1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

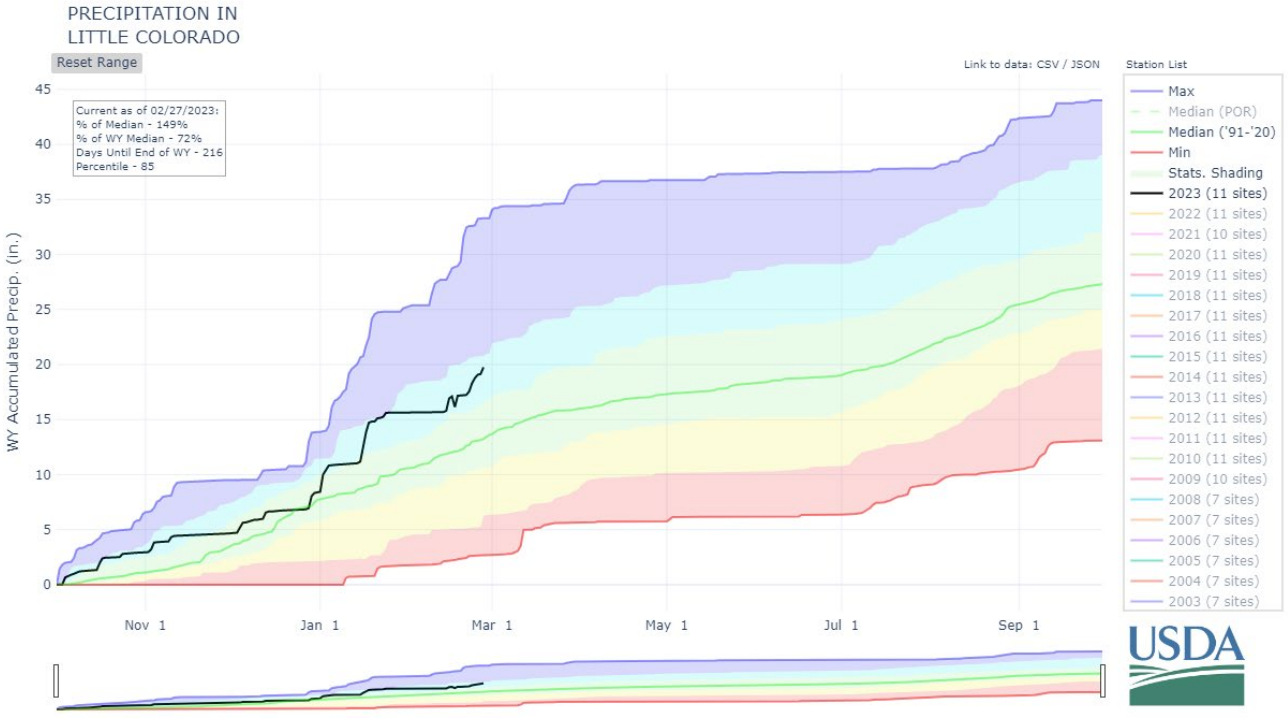
Reservoir Storage Middle of January, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
San Carlos Reservoir	371.5	34.5	140.2	875.0

Watershed Snowpack Analysis February 16, 2023	# of Sites	% Median	Last Year % Median
San Francisco - Upper Gila	8	120%	54%

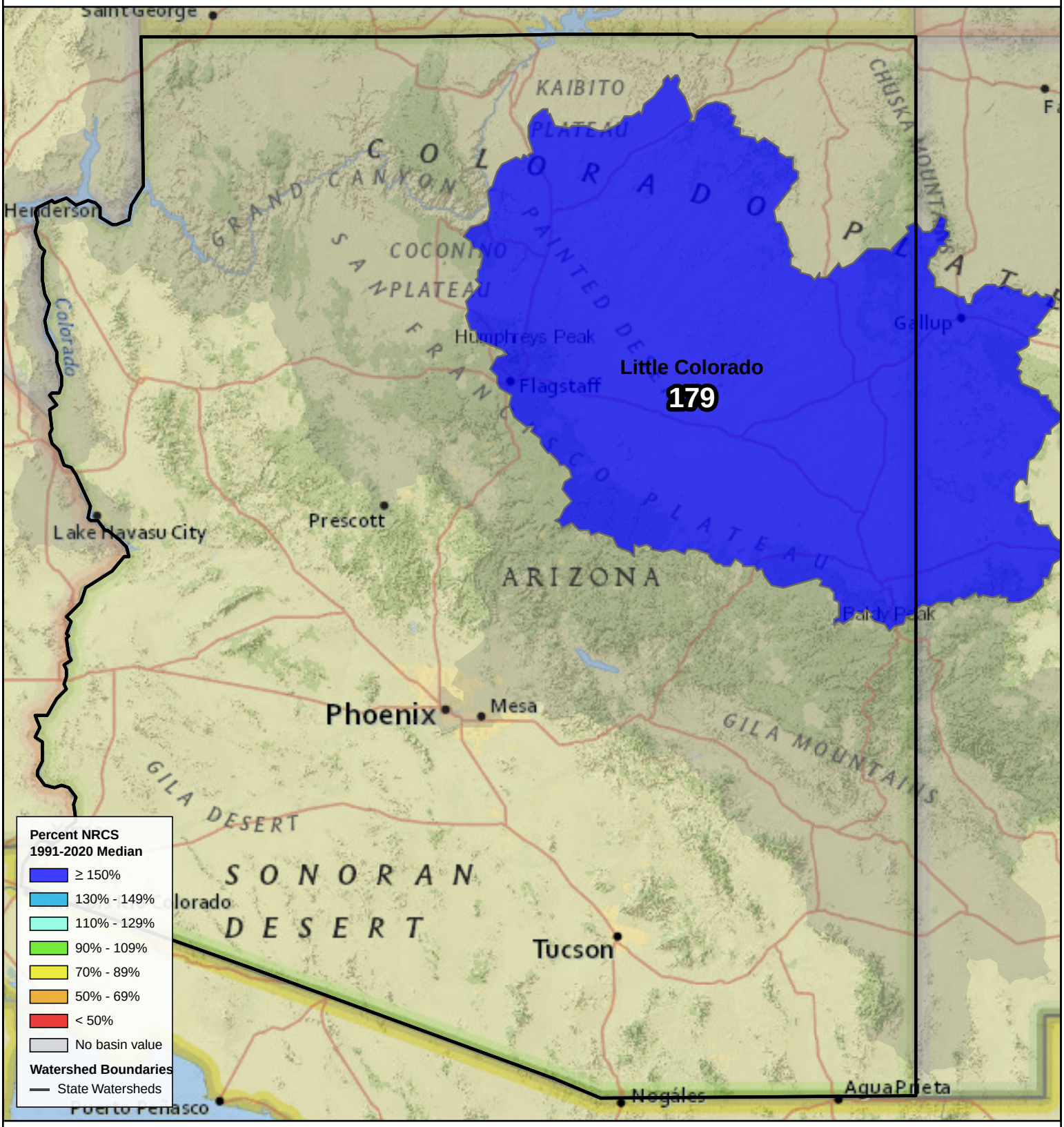
LITTLE COLORADO RIVER BASIN as of February 15, 2023

Well above median streamflow levels are forecast for the basin. In the Little Colorado River, above Lyman Lake, the forecast calls for 100% of median streamflow through June. At Blue Ridge (C.C. Cragin) Reservoir, inflow to the lake is forecast at 230% of median through May. Snow survey measurements show the snowpack for this basin to be at 179% of median.





Snow Water Equivalent	Little Colorado River Basin Percent NRCS 1991-2020 Median	Middle of February, 2023



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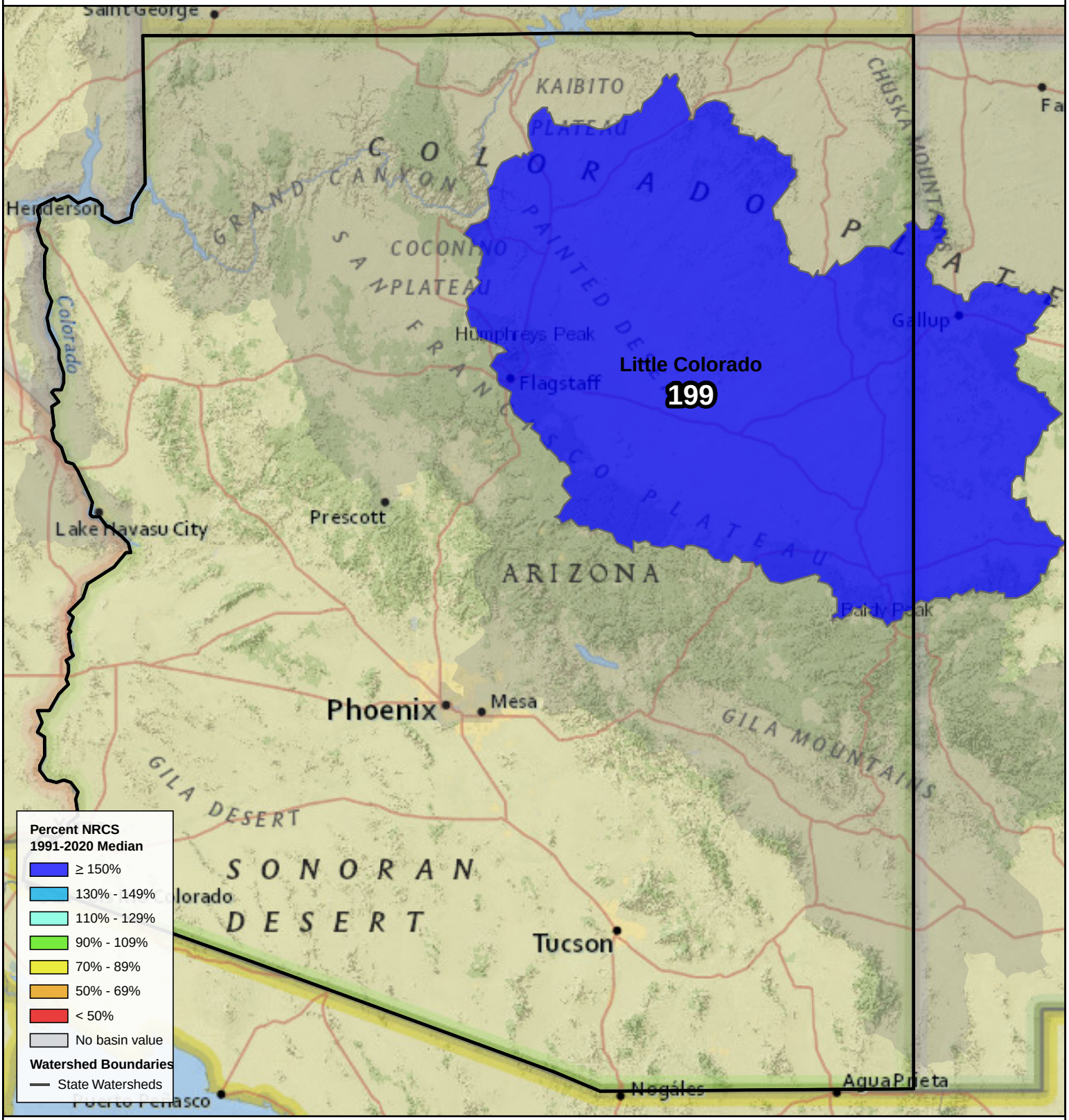
Forecast Volume, 50% Exceedance Probability	Little Colorado River Basin Percent NRCS 1991-2020 Median	Primary Period, February 16, 2023



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Little Colorado
Streamflow Forecasts - February 16, 2023

Little 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						
Rio Nutria nr Ramah[3]								
Little Colorado R ab Lyman Lake[3]	FEB-JUN	2.1	3.9	5.5	100%	7.3	10.5	5.5
Blue Ridge Reservoir Inflow[2]	FEB-MAY	6.7	16.2	26	230%	39	66	11.3
Zuni R ab Black Rock Reservoir								
Lake Mary Reservoir Inflow	FEB-MAY	4.4	6.7	8.6	261%	10.8	14.8	3.3

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

Reservoir Storage Middle of January, 2023	Current (KAF)	Last Year (KAF)	Median (KAF)	Capacity (KAF)
Lyman Reservoir	7.3	4.8	8.0	30.0
Cragin Dam Reservoir	8.9	6.3	8.9	0.0
Show Low Lake			3.1	5.1

Watershed Snowpack Analysis February 16, 2023	# of Sites	% Median	Last Year % Median
Little Colorado	11	185%	72%

CHUSKA MOUNTAINS as of February 15, 2023

Well above median streamflow levels are forecast for Wheatfields Creek, Captain Tom Wash, and Bowl Canyon Creek. Snow survey measurements conducted by staff of the Navajo Nation Water Management Branch show the Chuska snowpack to be at 163% of median.

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Chuska - Defiance	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Median	30% (KAF)	10% (KAF)	30yr Median (KAF)
Bowl Canyon Ck ab Asaayi Lake[3]								
	MAR-MAY	0.59	1.03	1.44	176%	1.94	2.9	0.82
Captain Tom Wash nr Two Gray Hills[3]								
	MAR-MAY	0.64	1.76	3	484%	4.7	8.3	0.62
Wheatfields Ck nr Wheatfields								
	MAR-MAY	1.24	2.2	3.1	373%	4.2	6.3	0.83

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

Snow Water Equivalent	Chuska Mountains Percent NRCS 1991-2020 Median	Middle of February, 2023

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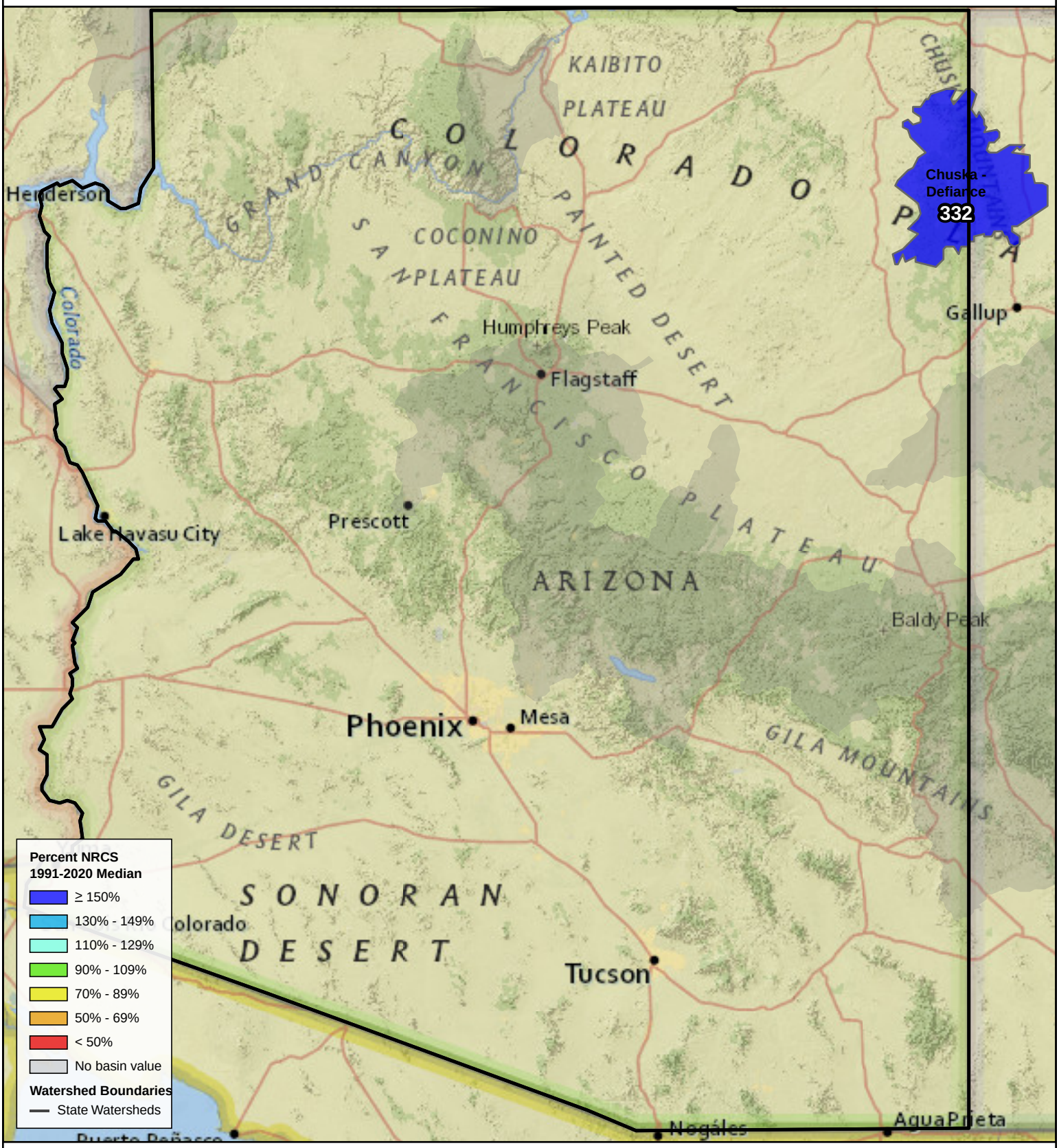
Forecast Volume,
50% Exceedance Probability

Chuska Mountains

Percent NRCS 1991-2020 Median

Primary Period, February 16, 2023



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Basinwide Summary: February 16, 2023
(Medians based on 1991-2020 reference period)

Snowpack Summary for February 16, 2023

San Francisco - Upper Gila	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Beaver Head	SNOTEL	7990	12	3.6	1.8	200%	1.3	72%
Coronado Trail	SNOTEL	8400	13	4.4	2.0	220%	0.2	10%
Coronado Trail	SC	8350			1.2		0.4	33%
Frisco Divide	SNOTEL	8000	17	3.5	2.0	175%	1.6	80%
Hannagan Meadows	SNOTEL	9020	33	8.1	8.1	100%	6.1	75%
Lookout Mountain	SNOTEL	8500	2	0.8	1.2	67%	0.0	0%
Nutrioso	SC	8500			0.6		0.6	100%
Nutrioso	SNOTEL	8500	7	0.7	0.0		0.0	
Signal Peak	SNOTEL	8360	3	0.6	2.6	23%	0.0	0%
Silver Creek Divide	SNOTEL	9000	26	7.7	6.9	112%	4.2	61%
State Line	SC	8000			1.5			
Basin Index						**120%**		**54%**
# of sites						8		8

Salt	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baldy	SNOTEL	9125	33	7.3	6.0	122%	4.4	73%
Beaver Head	SNOTEL	7990	12	3.6	1.8	200%	1.3	72%
Buck Spring	SC	7400			0.9		0.0	0%
Coronado Trail	SNOTEL	8400	13	4.4	2.0	220%	0.2	10%
Coronado Trail	SC	8350			1.2		0.4	33%
Fort Apache	SC	9160			7.1		5.6	79%
Hannagan Meadows	SNOTEL	9020	33	8.1	8.1	100%	6.1	75%
Hawley Lake	SNOTEL	8300	52	12.6			8.0	
Heber	SNOTEL	7640	44	10.9	3.9	279%	1.7	44%
Maverick Fork	SNOTEL	9200	24	5.9	7.0	84%	5.4	77%
Promontory	SNOTEL	7930	44	13.4	9.0	149%	4.8	53%
Wildcat	SNOTEL	7850	22	4.9	2.8	175%	1.0	36%
Workman Creek	SNOTEL	6900	29	7.8	4.0	195%	0.0	0%
Basin Index						**149%**		**56%**
# of sites						9		9

Little Colorado	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	32	9.1	3.2	284%	0.2	6%
Baker Butte No. 2	SC	7700			7.4		3.9	53%
Baker Butte Smt	SNOTEL	7700	48	12.1	9.1	133%	5.3	58%
Baldy	SNOTEL	9125	33	7.3	6.0	122%	4.4	73%
Boon	SC	8140						
Buck Spring	SC	7400			0.9		0.0	0%
Cheese Springs	SC	8700			4.5		3.9	87%
Dan Valley	SC	7640						
Fort Apache	SC	9160			7.1		5.6	79%
Fort Valley	SNOTEL	7350	22	6.6	0.0		0.3	
Fort Valley	SC	7350			1.2		0.5	42%
Heber	SNOTEL	7640	44	10.9	3.9	279%	1.7	44%
Lake Mary	SC	6930			1.7		2.0	118%
Maverick Fork	SNOTEL	9200	24	5.9	7.0	84%	5.4	77%
Mcgaffey	SC	8120						
Mormon Mountain	SNOTEL	7500	42	13.9	3.9	356%	2.7	69%

Mormon Mountain Summit #2	SC	8470			7.0		8.4	120%
Mormon Mtn Summit	SNOTEL	8500	47	13.3	7.2	185%	6.5	90%
Nutrioso	SC	8500			0.6		0.6	100%
Nutrioso	SNOTEL	8500	7	0.7	0.0		0.0	
Promontory	SNOTEL	7930	44	13.4	9.0	149%	4.8	53%
Snow Bowl #2	SC	11200			11.6		9.1	78%
Snowslide Canyon	SNOTEL	9730	69	21.1	12.4	170%	13.4	108%
Basin Index						**185%**		**72%**
# of sites						11		11

Verde	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	32	9.1	3.2	284%	0.2	6%
Baker Butte No. 2	SC	7700			7.4		3.9	53%
Baker Butte Smt	SNOTEL	7700	48	12.1	9.1	133%	5.3	58%
Bar M	SNOTEL	6393	22	9.8			0.0	
Chalender	SNOTEL	7100	28	7.3	2.6	281%	2.4	92%
Chalender	SC	7100			1.0		0.0	0%
Fort Valley	SNOTEL	7350	22	6.6	0.0		0.3	
Fort Valley	SC	7350			1.2		0.5	42%
Fry	SNOTEL	7200	49	14.7	5.8	253%	4.9	84%
Happy Jack	SC	7630			2.7		1.4	52%
Happy Jack	SNOTEL	7630	44	12.0	5.2	231%	5.4	104%
Mormon Mountain	SNOTEL	7500	42	13.9	3.9	356%	2.7	69%
Mormon Mountain Summit #2	SC	8470			7.0		8.4	120%
Mormon Mtn Summit	SNOTEL	8500	47	13.3	7.2	185%	6.5	90%
Newman Park	SC	6750			1.3		0.8	62%
Snow Bowl #2	SC	11200			11.6		9.1	78%
White Horse Lake	SNOTEL	7180	33	9.3	2.2	423%	1.4	64%
Williams Ski Run	SC	7720			6.7			
Basin Index						**251%**		**74%**
# of sites						9		9

Chuska - Defiance	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Beaver Spring	SC	9220			6.7		7.4	110%
Beaver Spring	SNOTEL	9200	56	12.8	8.2	156%	6.1	74%
Bowl Canyon	SC	8980	33	9.4	7.6	124%	7.8	103%
Fluted Rock	SC	7800			3.2		3.2	100%
Hidden Valley	SC	8480	30	9.0	5.5	164%	7.2	131%
Missionary Spring	SC	7940	27	6.6	3.3	200%	3.6	109%
Navajo Whiskey Ck	SNOTEL	9050	61	15.2	7.7	197%	6.6	86%
Tsaile Canyon #1	SC	8160	43	11.2	5.7	196%	6.2	109%
Tsaile Canyon #3	SC	8920	36	9.9	7.8	127%	7.2	92%
Whiskey Creek	SC	9050	38	12.9	7.5	172%	10.2	136%
Basin Index						**163%**		**103%**
# of sites						8		8

Grand Canyon	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Bright Angel	SC	8400			5.7			
Grand Canyon	SC	7500			1.0		0.7	70%
Basin Index								
# of sites						0		0

Virgin	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Gardner Peak	SNOTEL	8322	54	12.9	9.7	133%	8.0	82%
Gutz Peak	SNOTEL	6763	46	15.4	7.3	211%	10.7	147%
Harris Flat	SNOTEL	7792	36	11.8	5.4	219%	7.8	144%
Kolob	SNOTEL	9263	76	26.0	14.2	183%	13.1	92%
Little Grassy	SNOTEL	6065	23	8.2	1.6	513%	2.7	169%
Long Flat	SNOTEL	7982	52	11.5	6.2	185%	6.5	105%
Long Valley Jct	SNOTEL	7465	34	10.8	4.0	270%	5.4	135%
Midway Valley	SNOTEL	9827	86	28.0	15.2	184%	11.3	74%
Webster Flat	SNOTEL	9203	59	18.2	9.1	200%	9.0	99%
Basin Index						**196%**		**102%**
# of sites						9		9