United States Department of Agriculture

Natural Resources Conservation Service

Arizona Basin Outlook Report January 15, 2020

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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.

For more water supply and resource management information, contact:

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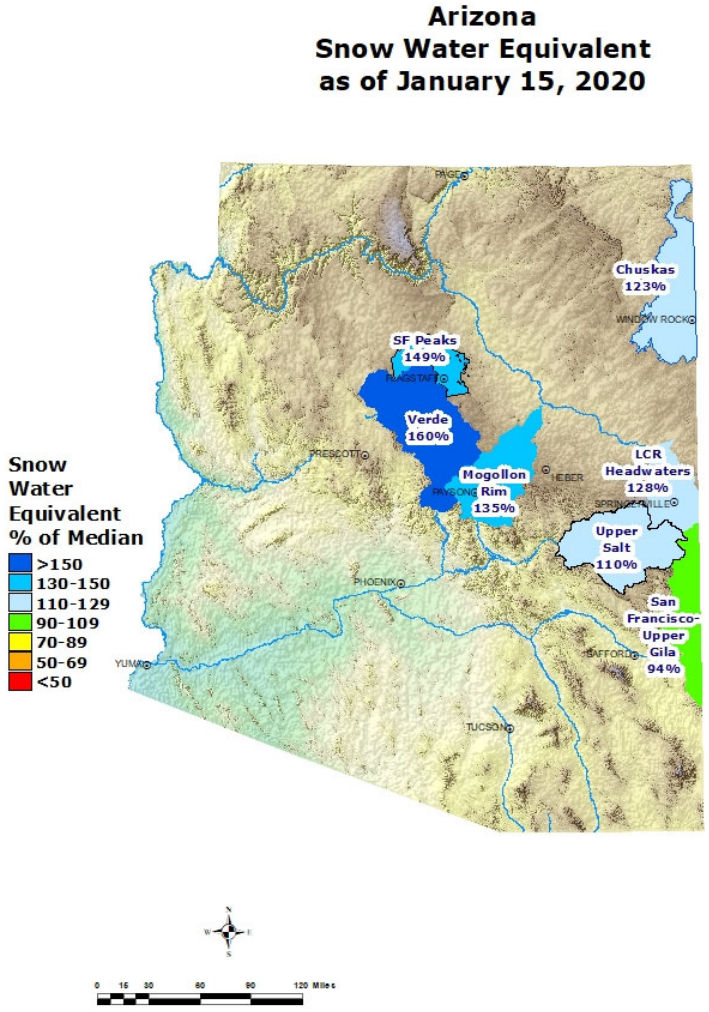
ARIZONA Basin Outlook Report
as of January 15, 2020

SUMMARY

As of January 15, snowpack levels are normal to well above normal throughout the major basins of the state. Precipitation for the first half of January was well below normal in the major river basins. The Salt and Verde River reservoir system stands at 74 percent of capacity, while San Carlos Reservoir is at 6 percent of capacity. The mid-month forecast calls for above normal to well above normal runoff in all basins for the spring runoff period.

SNOWPACK

Snow water equivalent levels in the state's major river basins are normal to well above normal, ranging from 160 percent of median in the Verde River Basin, to 94 percent of median in the Gila River Basin. The statewide snowpack is above normal at 128 percent of median.

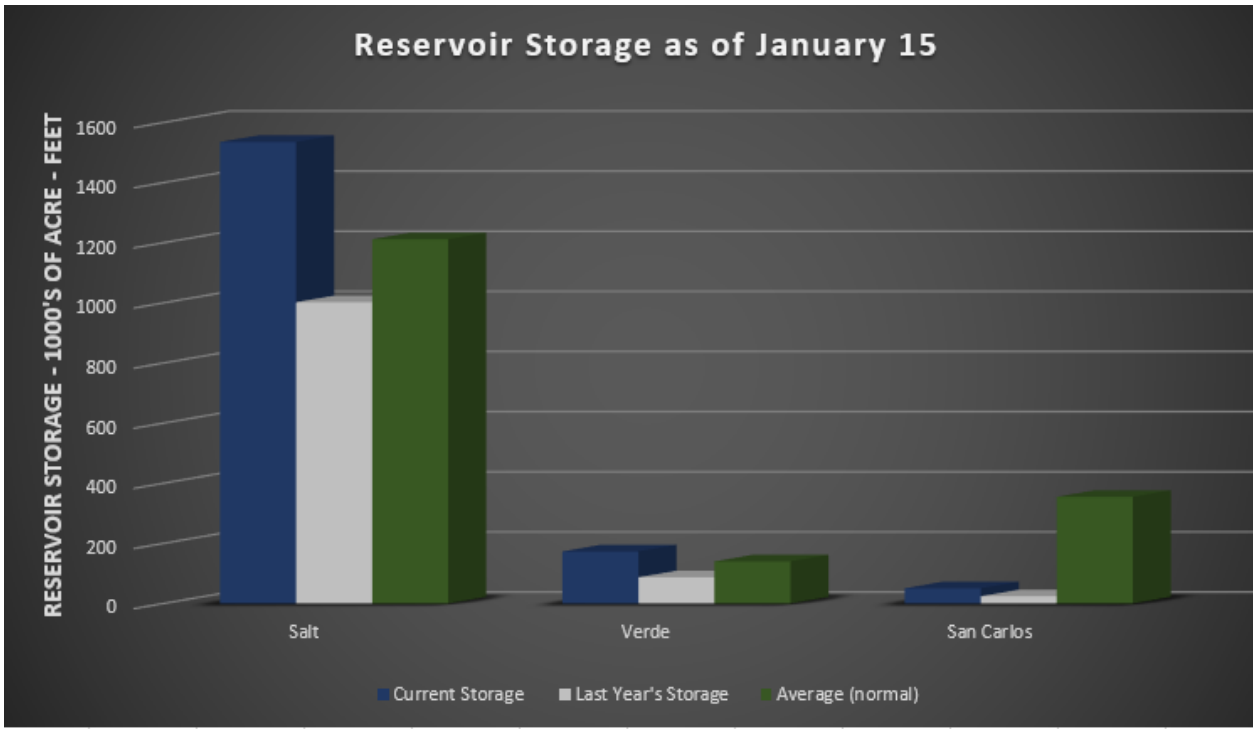


PRECIPITATION

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

RESERVOIR STORAGE

As of January 15, the Salt and Verde River reservoir system stands at 74 percent of capacity. San Carlos Reservoir is currently at 6 percent of capacity.

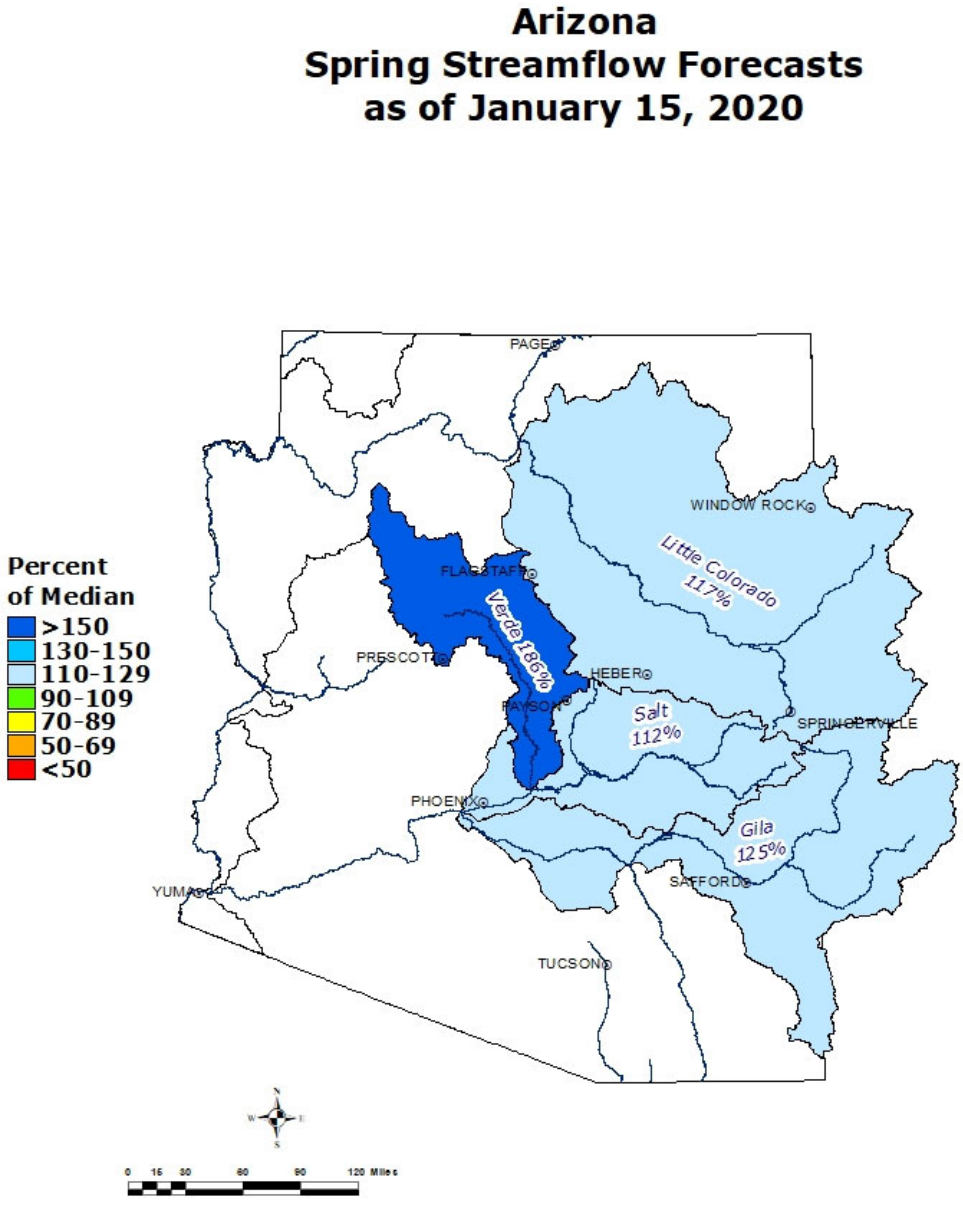


Key storage volumes displayed in thousands of acre-feet (x1000):

Reservoir	Current Storage	Last Year Storage	30-Year Average	Storage Capacity
Salt River System	1535.5	1002.6	1212.0	2025.8
Verde River System	173.4	87.5	140.2	287.4
San Carlos Reservoir	50.7	24.5	355.0	875.0
Lyman Lake	8.7	3.7	12.0	30.0
Lake Havasu	555.4	568.7	561.2	619.0
Lake Mohave	1664.4	1618.1	1659.0	1810.0
Lake Mead	11079.0	10304.0	20361.0	26159.0
Lake Powell	12604.0	9846.0	17553.0	24322.0

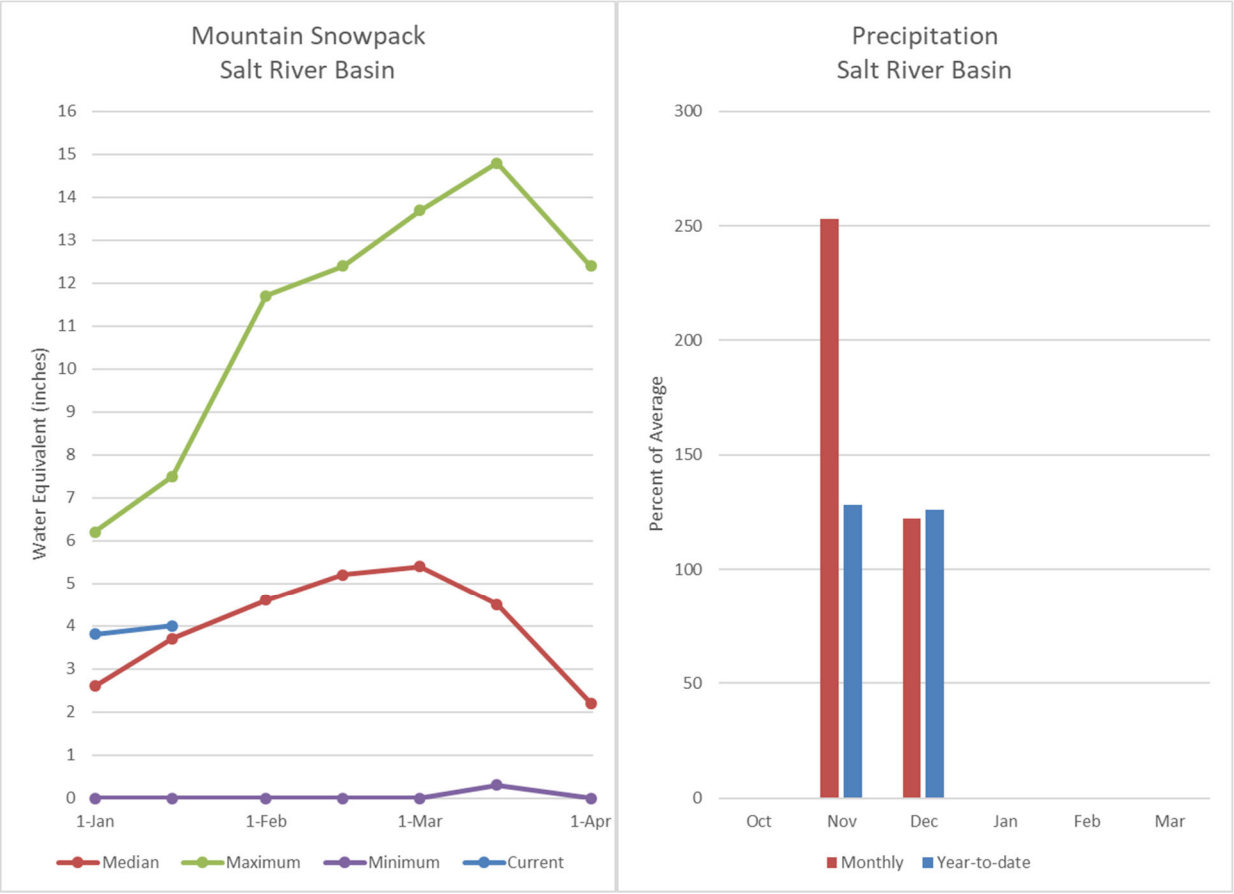
STREAMFLOW

As of January 15, the forecast calls for above normal to well above normal streamflow for the spring runoff period, ranging from 112 percent of median in the Salt River near Roosevelt to 186 percent of median in the Verde River above Horseshoe Dam. Total precipitation since the beginning of the water year has been well above average, producing favorable conditions for runoff. Please refer to the basin forecast tables found in this report for more information regarding water supply forecasts.



SALT RIVER BASIN as of January 15, 2020

Above normal streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 112% of median streamflow through May, while at Tonto Creek, the forecast calls for 205% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 110% of median.



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Salt River Basin
Streamflow Forecasts - January 16, 2020

SALT RIVER BASIN	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast 90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Salt R nr Roosevelt[3]								
	MAR-MAY	119	194	260	108%	335	480	240
	J15-MAY	152	250	335	112%	440	630	300
Tonto Ck ab Gun Ck nr Roosevelt[3]								
	JAN			12.1	318%			3.8
	J15-MAY	31	55	78	205%	105	156	38

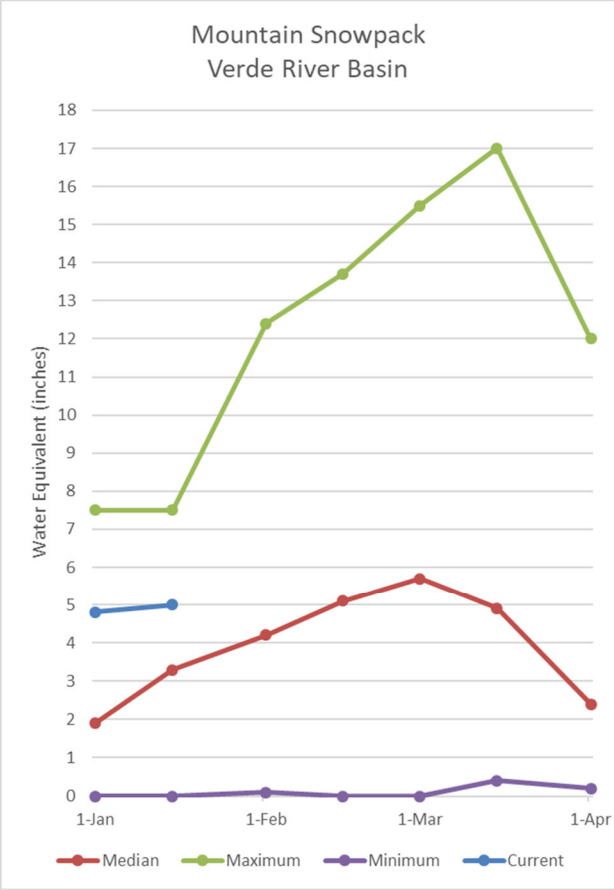
1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

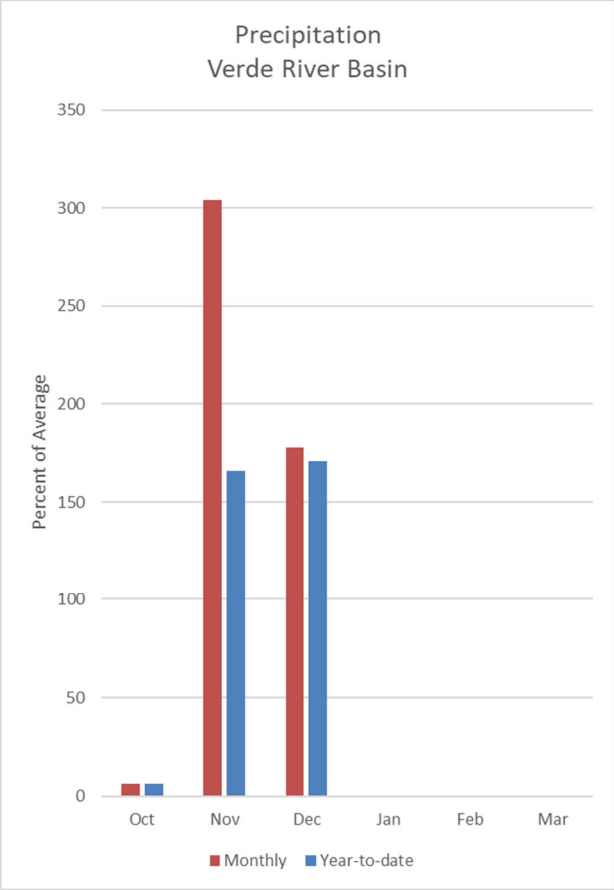
Reservoir Storage **Middle of December, 2019**	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Salt River Reservoir System	1535.5	1002.6	1212.0	2025.8
Basin-wide Total	1535.5	1002.6	1212.0	2025.8
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis **January 16, 2020**	# of Sites	% Median	Last Year % Median
SALT RIVER BASIN	8	110%	103%

VERDE RIVER BASIN as of January 15, 2020

Well above normal streamflow levels are forecast for the basin. In the Verde River above Horseshoe Dam, the forecast calls for 186% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 160% of median.





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Verde River Basin
Streamflow Forecasts - January 16, 2020

VERDE RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Verde R bl Tangle Ck ab Horseshoe Dam[3]								
	JAN			45	196%			23
	J15-MAY	121	200	270	186%	355	505	145

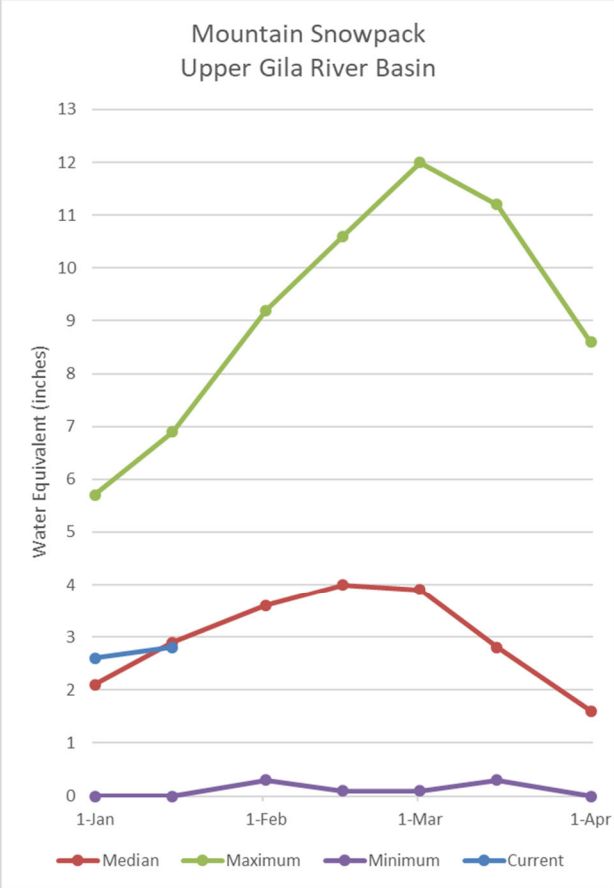
1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

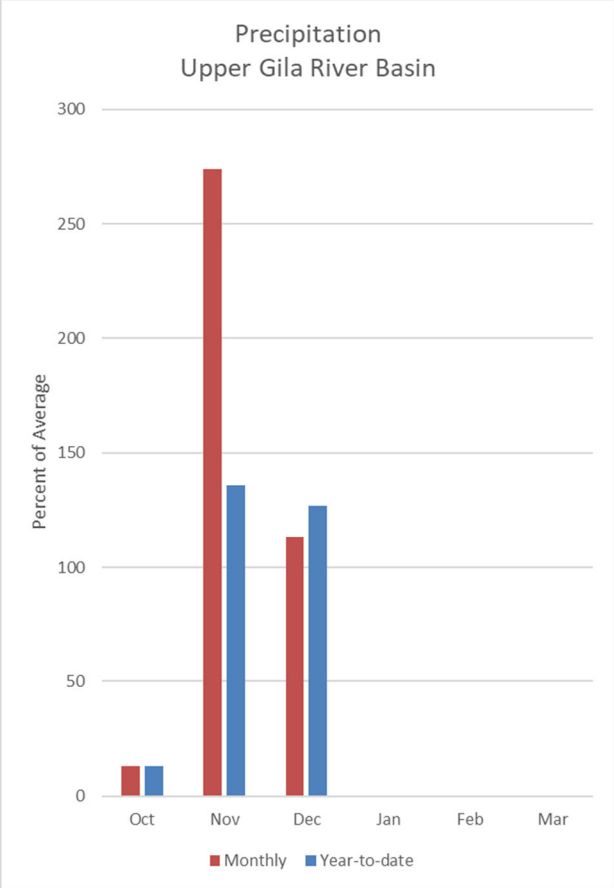
Reservoir Storage Middle of December, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Verde River Reservoir System	173.4	87.5	140.2	287.4
Basin-wide Total	173.4	87.5	140.2	287.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 16, 2020	# of Sites	% Median	Last Year % Median
VERDE RIVER BASIN	10	160%	101%

SAN FRANCISCO-UPPER GILA RIVER BASIN as of January 15, 2020

Above normal streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 111% of median streamflow levels through May. In the Gila River, near Solomon, the forecast calls for 125% of median streamflow levels through May. At San Carlos Reservoir, inflow to the lake is forecast at 151% of median through May. Snow survey measurements show the snowpack for this basin to be at 94% of median.





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San Francisco-Upper Gila River Basin
Streamflow Forecasts - January 16, 2020

		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
SAN FRANCISCO-UPPER GILA RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Gila R at Gila[3]								
	J15-MAY	28	46	62	115%	81	116	54
Gila R bl Blue Ck nr Virden[3]								
	J15-MAY	31	62	89	124%	121	177	72
San Francisco R at Glenwood[3]								
	J15-MAY	7.4	15.5	23	117%	34	54	19.6
San Francisco R at Clifton[3]								
	J15-MAY	16.8	40	62	111%	88	136	56
Gila R nr Solomon[3]								
	JAN	11.8	19.1	25	127%	32	43	19.7
	J15-MAY	24	64	162	125%	148	230	130
San Carlos Reservoir Inflow[3]								
	J15-MAY	19.9	67	136	151%	177	290	90

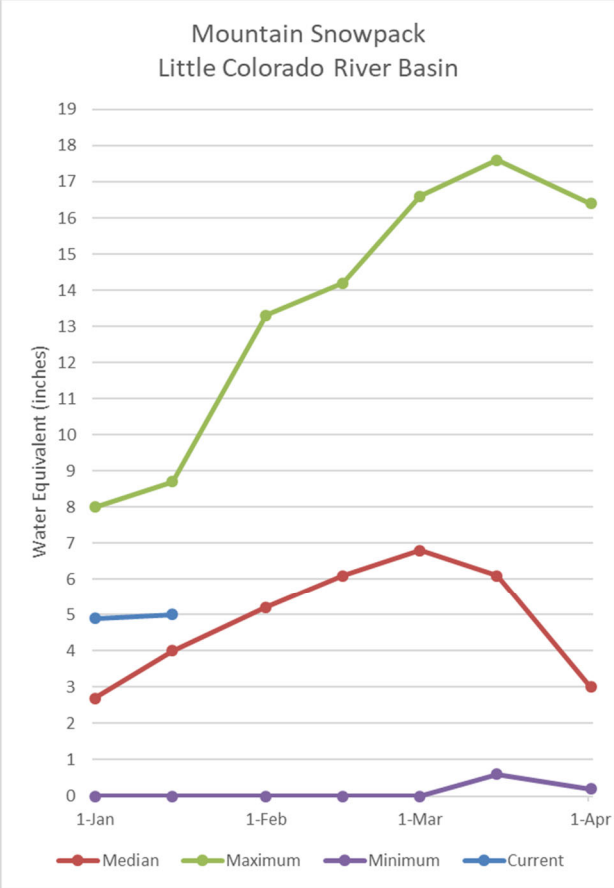
1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

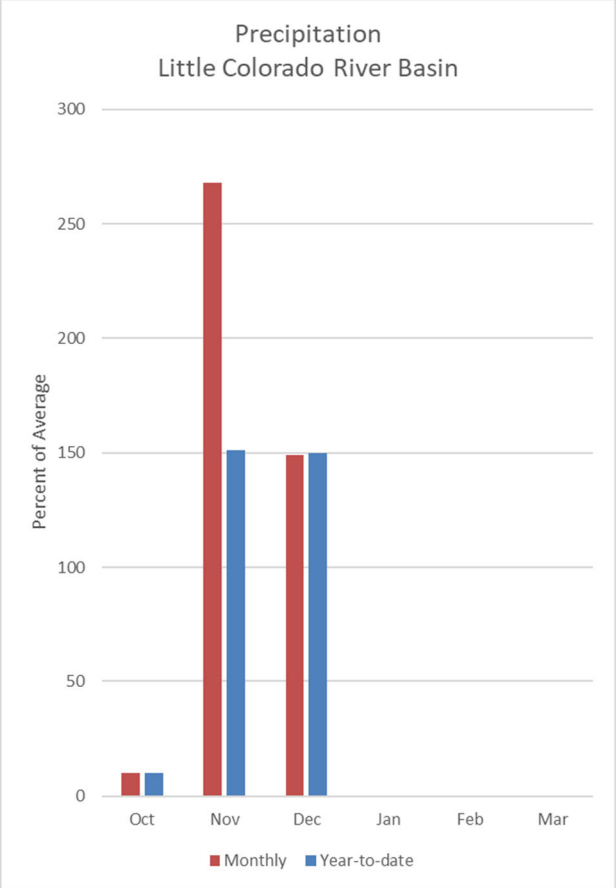
Reservoir Storage Middle of December, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
San Carlos Reservoir	50.7	25.2	355.0	875.0
Basin-wide Total	50.7	25.2	355.0	875.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 16, 2020	# of Sites	% Median	Last Year % Median
SAN FRANCISCO-UPPER GILA RIVER BASIN	7	94%	94%

LITTLE COLORADO RIVER BASIN as of January 15, 2020

Above normal streamflow levels are forecast for the basin. In the Little Colorado River, above Lyman Lake, the forecast calls for 117% of median streamflow through June. At Blue Ridge (C.C. Cragin) Reservoir, inflow to the lake is forecast at 145% of median through May. Snowpacks along the southern headwaters of the Little Colorado River, and along the central Mogollon Rim, were measured at 128% and 135% of median, respectively.





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Little Colorado River Basin
Streamflow Forecasts - January 16, 2020

LITTLE COLORADO RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
		Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						
Little Colorado R ab Lyman Lake[3]	JAN-JUN	3.7	6.1	8.3	117%	10.9	15.8	7.1
Blue Ridge Reservoir Inflow[3]	JAN-MAY	9.1	16.9	24	145%	33	50	16.6
Lake Mary Reservoir Inflow[3]	JAN-MAY	2.3	3.9	12.4	258%	7.1	10.3	4.8

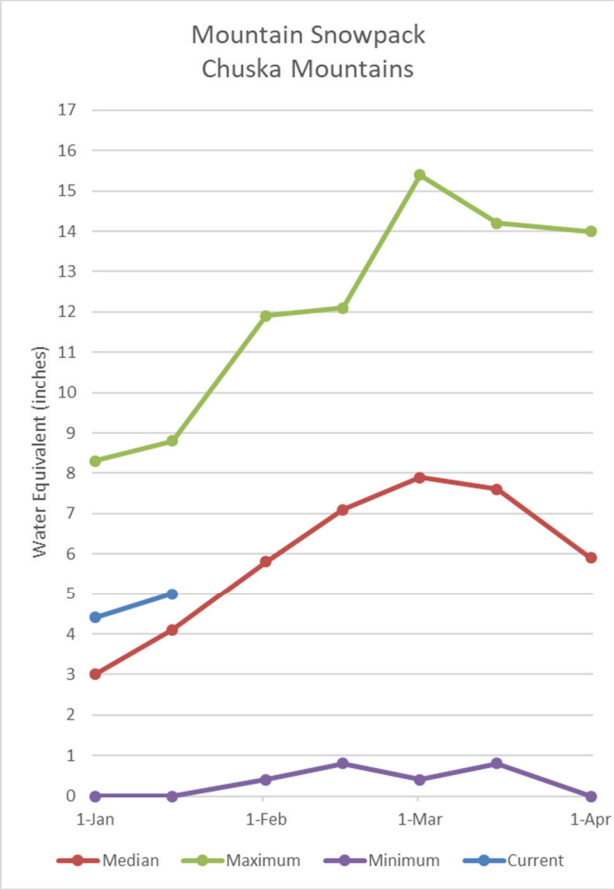
1) 90% and 10% exceedance probabilities are actually 95% and 5%
2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
3) Median value used in place of average

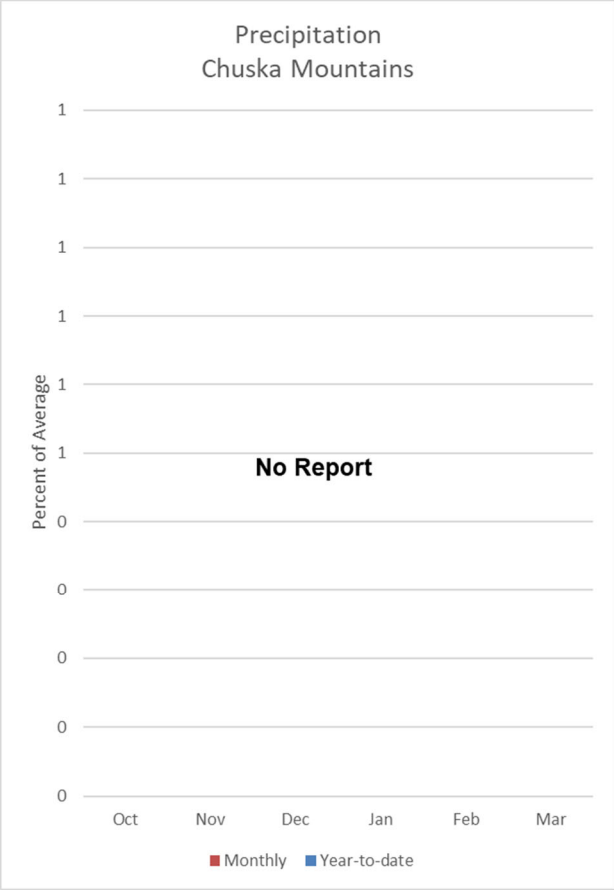
Reservoir Storage Middle of December, 2019	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lyman Reservoir	8.7	3.7	12.0	30.0
Basin-wide Total	8.7	3.7	12.0	30.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 16, 2020	# of Sites	% Median	Last Year % Median
LITTLE COLORADO RIVER BASIN	9	128%	103%
CENTRAL MOGOLLON RIM	4	135%	102%

CHUSKA MOUNTAINS as of January 15, 2020

Snow survey measurements conducted by staff of the Navajo Nation Water Management Branch show the Chuska snowpack to be at 123% of median. The forecast calls for below normal to well above normal runoff for Wheatfields Creek, Captain Tom Wash, and Bowl Canyon Creek.





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Chuska Mountains
Streamflow Forecasts - January 15, 2020

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

CHUSKA MOUNTAINS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Captain Tom Wash nr Two Gray Hills								
	MAR-MAY		0.24	0.93	36	2.4		2.6
Wheatfields Ck nr Wheatfields								
	MAR-MAY		2.5	3.9	186%	5.6		2.1
Bowl Canyon Ck ab Asaayi Lake								
	MAR-MAY		1.72	2.5	192%	3.4		1.3

Watershed Snowpack Analysis January 16, 2020	# of Sites	% Median	Last Year % Median
CHUSKA MOUNTAINS	6	123%	105%
DEFIANCE PLATEAU	1	70%	180%

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Basinwide Summary: January 16, 2020
(Averages/Medians based on 1981-2010 reference period)

Snowpack Summary for January 16, 2020

SALT RIVER BASIN	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baldy	SNOTEL	9125	20	6.1	5.0	122%	5.5	110%
Beaver Head	SNOTEL	7990	7	2.3	3.2	72%	3.0	94%
Buck Spring	SC	7400	8	1.7	2.3	74%		
Coronado Trail	SNOTEL	8400	6	2.8	2.8	100%	2.8	100%
Hawley Lake	SNOTEL	8300	26	7.6			7.7	
Coronado Trail	SC	8350	7	2.4	2.2	109%		
Fort Apache	SC	9160	27	7.4	5.2	142%	5.3	102%
Hannagan Meadows	SNOTEL	9020	22	6.5	6.1	107%	6.7	110%
Maverick Fork	SNOTEL	9200	21	6.0	5.2	115%	5.2	100%
Nutrioso	SC	8500	4	1.1	1.3	85%		
Nutrioso	SNOTEL	8500	1	0.7			1.0	
Wildcat	SNOTEL	7850	7	1.6	2.4	67%	2.7	113%
Workman Creek	SNOTEL	6900	13	3.6	3.1	116%	2.9	94%
Basin Index						**110%**		**103%**
# of sites						8		8

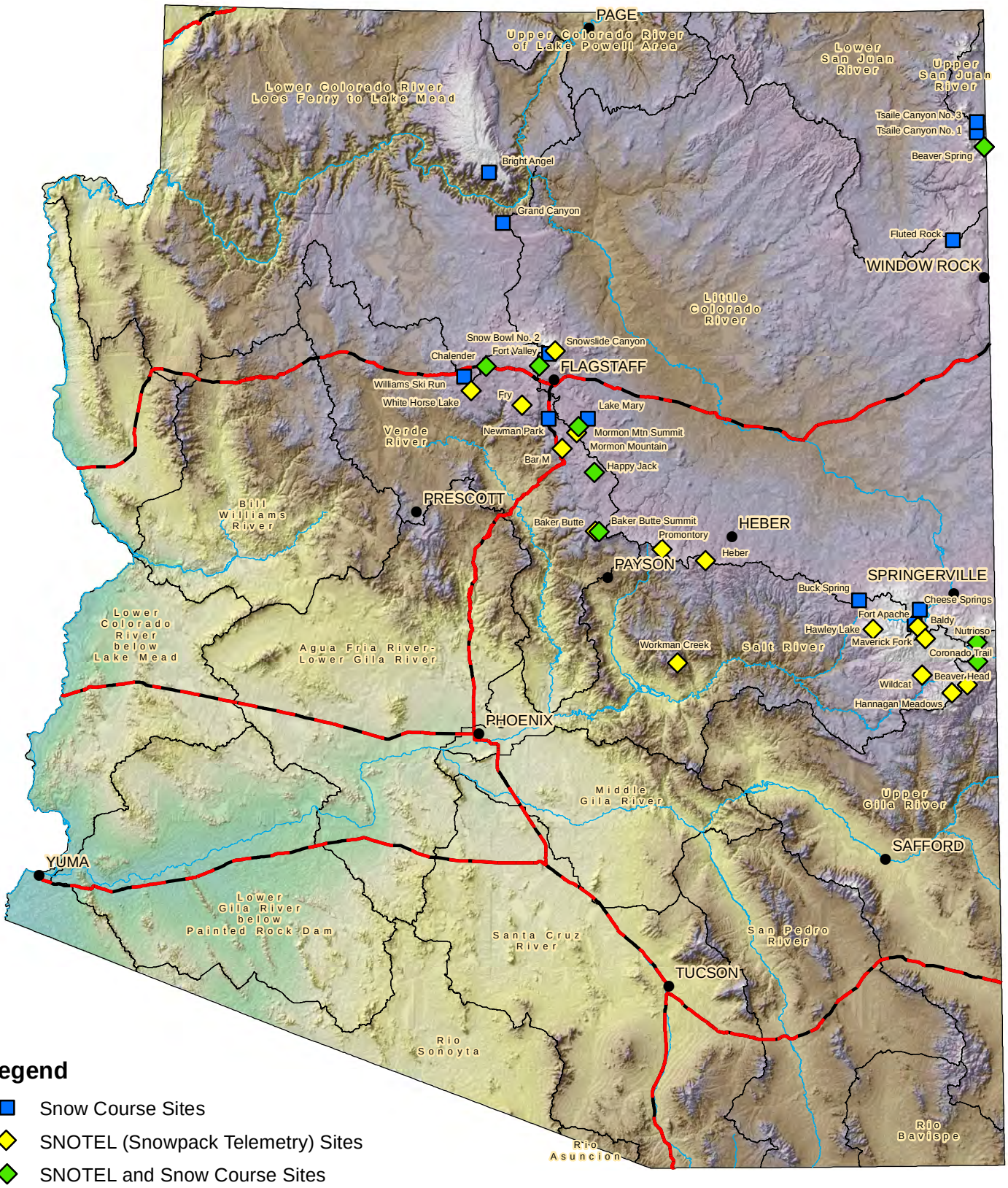
VERDE RIVER BASIN	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	19	4.9	2.9	169%	3.4	117%
Baker Butte No. 2	SC	7700	23	7.0	5.6	125%	3.4	61%
Baker Butte Smt	SNOTEL	7700	33	10.5			6.1	
Bar M	SNOTEL	6393	6	3.5			2.0	
Chalender	SC	7100	12	3.0	1.6	188%	0.9	56%
Chalender	SNOTEL	7100	15	3.9			3.5	
Fort Valley	SC	7350	7	2.1	1.8	117%	1.2	67%
Fort Valley	SNOTEL	7350	3	1.3			1.4	
Fry	SNOTEL	7200	27	8.1	4.0	203%	4.9	123%
Happy Jack	SNOTEL	7630	14	4.1	3.0	137%	4.3	143%
Happy Jack	SC	7630	10	2.0	2.8	71%		
Mormon Mountain	SNOTEL	7500	12	5.3	2.8	189%	3.2	114%
Mormon Mountain Summit #2	SC	8470	30	9.2	5.4	170%	5.6	104%
Mormon Mtn Summit	SNOTEL	8500	24	6.7			4.4	
Newman Park	SC	6750	12	3.0	1.4	214%	1.6	114%
White Horse Lake	SNOTEL	7180	13	3.8	3.0	127%	3.2	107%
Williams Ski Run	SC	7720			4.8		2.3	48%
Basin Index						**160%**		**101%**
# of sites						10		10

SAN FRANCISCO PEAKS	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Snow Bowl #2	SC	11200	50	14.8	10.8	137%		
Snowslide Canyon	SNOTEL	9730	39	14.5	9.7	149%	10.2	105%
Basin Index						**149%**		**105%**
# of sites						1		1

SAN FRANCISCO-UPPER GILA RIVER BASIN	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Beaver Head	SNOTEL	7990	7	2.3	3.2	72%	3.0	94%
Coronado Trail	SNOTEL	8400	6	2.8	2.8	100%	2.8	100%
Coronado Trail	SC	8350	7	2.4	2.2	109%		
Frisco Divide	SNOTEL	8000	6	1.7	2.0	85%	2.0	100%
Hannagan Meadows	SNOTEL	9020	22	6.5	6.1	107%	6.7	110%
Hummingbird - Aerial And Snow Course	SC	10550						
Lookout Mountain	SNOTEL	8500	1	0.6	1.8	33%	0.5	28%

Nutrioso	SC	8500	4	1.1	1.3	85%		
Nutrioso	SNOTEL	8500	1	0.7			1.0	
Signal Peak	SNOTEL	8360	5	1.1	3.1	35%	1.2	39%
Silver Creek Divide	SNOTEL	9000	16	7.0	4.4	159%	5.9	134%
State Line	SC	8000			1.4			
Whitewater - Aerial And Snow Course	SC	10750						
Basin Index						**94%**		**94%**
# of sites						7		7
LITTLE COLORADO RIVER BASIN	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	19	4.9	2.9	169%	3.4	117%
Baker Butte No. 2	SC	7700	23	7.0	5.6	125%	3.4	61%
Baker Butte Smt	SNOTEL	7700	33	10.5			6.1	
Baldy	SNOTEL	9125	20	6.1	5.0	122%	5.5	110%
Buck Spring	SC	7400	8	1.7	2.3	74%		
Cheese Springs	SC	8700	16	4.2	3.4	124%	4.0	118%
Fort Apache	SC	9160	27	7.4	5.2	142%	5.3	102%
Heber	SNOTEL	7640	15	4.2	3.1	135%	4.4	142%
Lake Mary	SC	6930	8	2.0	2.2	91%	1.8	82%
Maverick Fork	SNOTEL	9200	21	6.0	5.2	115%	5.2	100%
Promontory	SNOTEL	7930	23	6.9	5.4	128%	6.2	115%
Basin Index						**128%**		**103%**
# of sites						9		9
CENTRAL MOGOLLON RIM	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	19	4.9	2.9	169%	3.4	117%
Baker Butte No. 2	SC	7700	23	7.0	5.6	125%	3.4	61%
Baker Butte Smt	SNOTEL	7700	33	10.5			6.1	
Heber	SNOTEL	7640	15	4.2	3.1	135%	4.4	142%
Promontory	SNOTEL	7930	23	6.9	5.4	128%	6.2	115%
Basin Index						**135%**		**102%**
# of sites						4		4
CHUSKA MOUNTAINS	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Beaver Spring	SC	9220	20	6.1	5.0	122%	4.3	86%
Beaver Spring	SNOTEL	9200	22	6.8			5.3	
Bowl Canyon	SC	8980	20	5.3	4.0	133%	3.8	95%
Hidden Valley	SC	8480	17	4.8			2.9	
Missionary Spring	SC	7940	8	1.7	2.5	68%	3.3	132%
Tsaile Canyon #1	SC	8160	15	4.9	3.2	153%	4.1	128%
Tsaile Canyon #3	SC	8920	22	6.3	5.4	117%	5.5	102%
Whiskey Creek	SC	9050	19	5.9	4.4	134%	4.7	107%
Navajo Whiskey Ck	SNOTEL	9050	23	7.2			6.4	
Basin Index						**123%**		**105%**
# of sites						6		6
DEFIANCE PLATEAU	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Fluted Rock	SC	7800	7	1.4	2.0	70%	3.6	180%
Basin Index						**70%**		**180%**
# of sites						1		1
NORTHWESTERN ARIZONA	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Bright Angel	SC	8400	18	5.3	5.1	104%	1.2	24%
Grand Canyon	SC	7500	6	1.3	1.7	76%		
Basin Index						**104%**		**24%**
# of sites						1		1

Arizona Snow Survey Data Sites



Legend

- Snow Course Sites
- SNOTEL (Snowpack Telemetry) Sites
- SNOTEL and Snow Course Sites
- Basin Boundaries

January 2017
Data Sources: NRCS / ALRIS
Projection: UTM Zone 12 Datum: NAD83

0 12.5 25 50 75 100 Miles

N

NRCS
Natural Resources Conservation Service