



Natural
Resources
Conservation
Service

Arizona

Basin Outlook Report

February 15, 2020



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.



For more water supply and resource management information, contact:

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ARIZONA Basin Outlook Report as of February 15, 2020

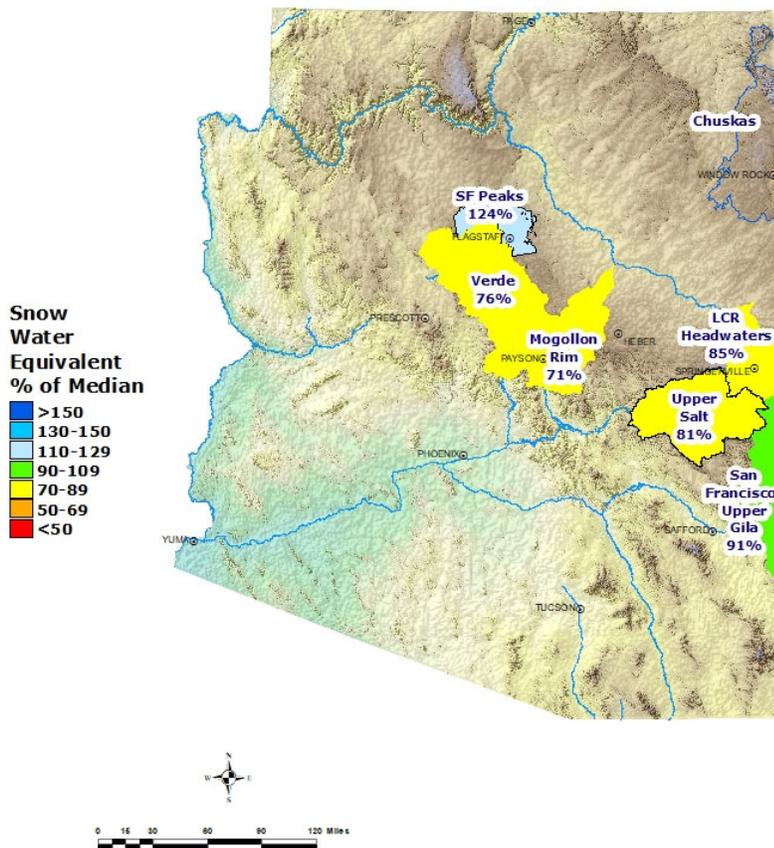
SUMMARY

As of February 15, snowpack levels are below normal to normal throughout the major basins of the state. Precipitation for the first half of February was well below normal to above normal in the major river basins. The Salt and Verde River reservoir system stands at 76 percent of capacity, while San Carlos Reservoir is at 10 percent of capacity. The mid-month forecast calls for well below normal to normal runoff in all basins for the spring runoff period.

SNOWPACK

Snow water equivalent levels in the state's major river basins are below normal to normal, ranging from 91 percent of median in the Gila River Basin, to 76 percent of median in the Verde River Basin. The statewide snowpack is below normal at 78 percent of median.

**Arizona
Snow Water Equivalent
as of February 15, 2020**

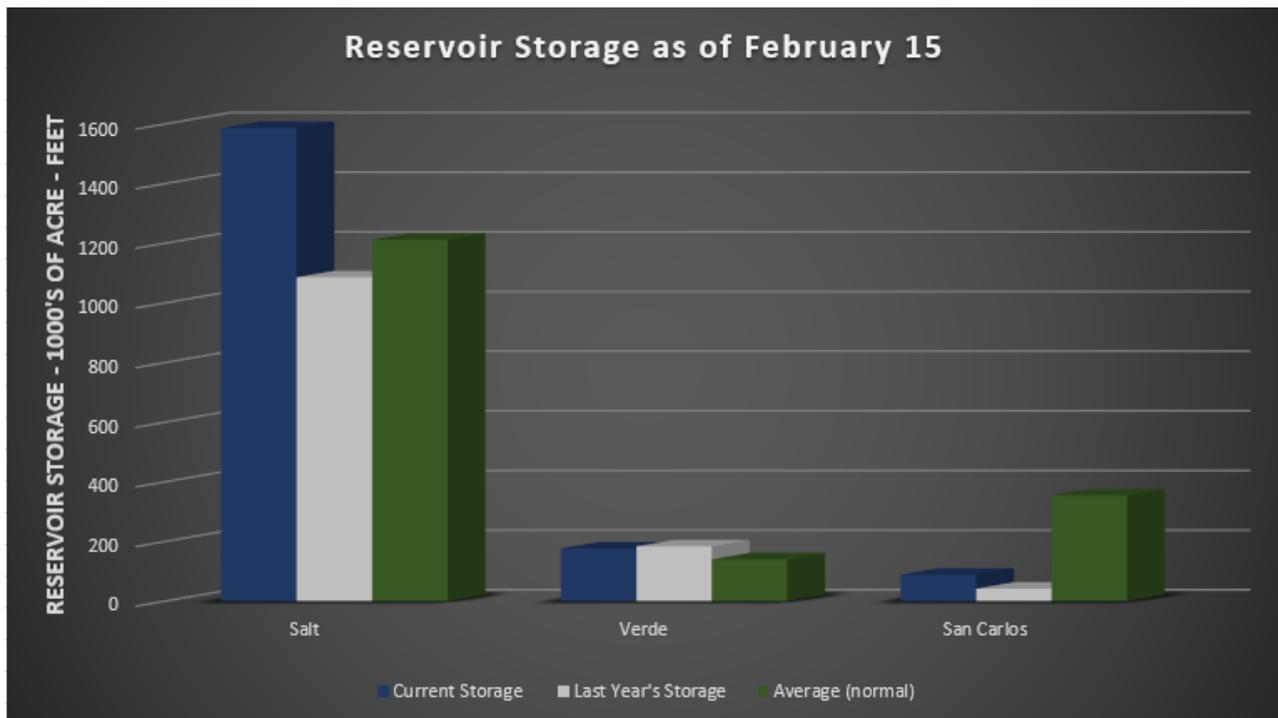


PRECIPITATION

Mountain data from NRCS SNOTEL sites and NWS Cooperator gages show that precipitation for the first half of February was well below average to above average in the major river basins. Cumulative precipitation since October 1 is 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 February 15, the Salt and Verde River reservoir system stands at 76 percent of capacity. San Carlos Reservoir is currently at 10 percent of capacity.



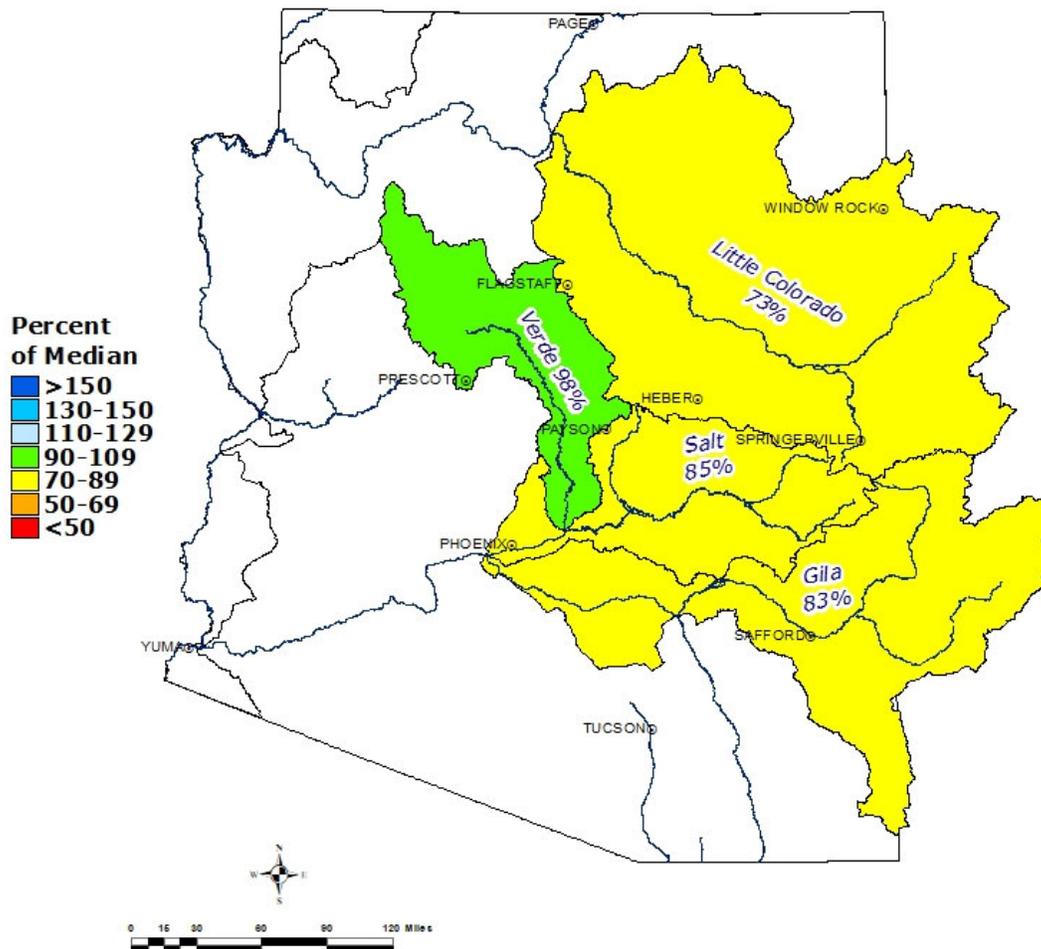
Key storage volumes displayed in thousands of acre-feet (x1000):

<u>Reservoir</u>	<u>Current Storage</u>	<u>Last Year Storage</u>	<u>30-Year Average</u>	<u>Storage Capacity</u>
Salt River System	1586.6	1086.5	1212.0	2025.8
Verde River System	176.9	184.1	140.2	287.4
San Carlos Reservoir	88.8	42.1	355.0	875.0
Lyman Lake	8.7	3.6	12.0	30.0
Lake Havasu	573.0	595.7	561.2	619.0
Lake Mohave	1695.0	1732.0	1659.0	1810.0
Lake Mead	11326.0	10507.0	20361.0	26159.0
Lake Powell	12138.0	9431.0	17553.0	24322.0

STREAMFLOW

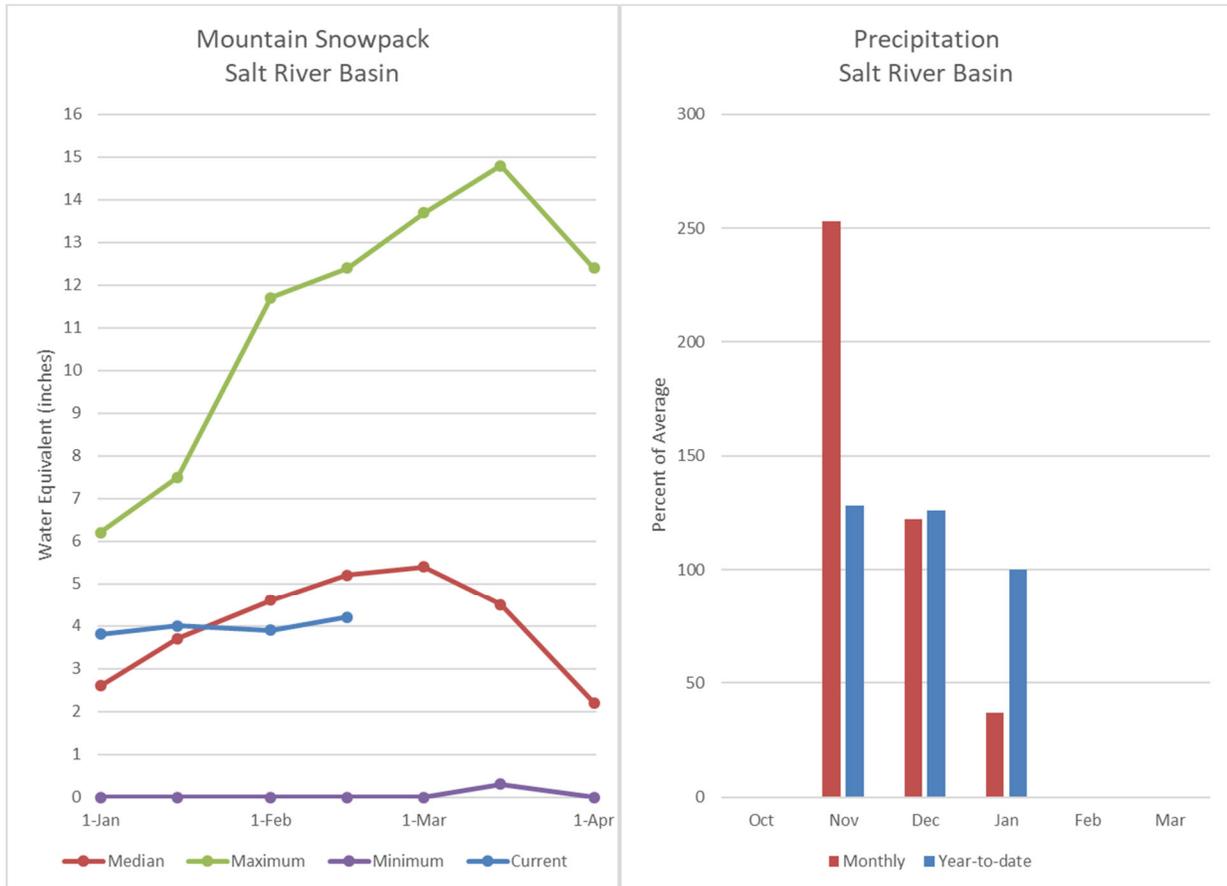
As of February 15, the forecast calls for well below normal to normal streamflow for the spring runoff period, ranging from 73 percent of median in the Little Colorado River above Lyman Lake to 98 percent of median in the Verde River above Horseshoe Dam. Total precipitation since the beginning of the water year has been near normal, producing favorable conditions for runoff. Please refer to the basin forecast tables found in this report for more information regarding water supply forecasts.

Arizona Spring Streamflow Forecasts as of February 15, 2020



SALT RIVER BASIN as of February 15, 2020

Below normal streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 85% of median streamflow through May, while at Tonto Creek, the forecast calls for 93% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 81% of median.



**Salt River Basin
Streamflow Forecasts - February 16, 2020**

SALT RIVER BASIN	Forecast Period	Forecast Exceedance Probabilities for Risk Assessment Chance that actual volume will exceed forecast						30yr Avg (KAF)
		90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	
Salt R nr Roosevelt ³	FEB			34	87%			39
	MAR-MAY	85	136	180	75%	235	330	240
	F15-MAY	113	171	220	85%	280	380	260
Tonto Ck ab Gun Ck nr Roosevelt ³	FEB			9	87%			10.3
	F15-MAY	7.7	16.1	25	93%	35	56	27

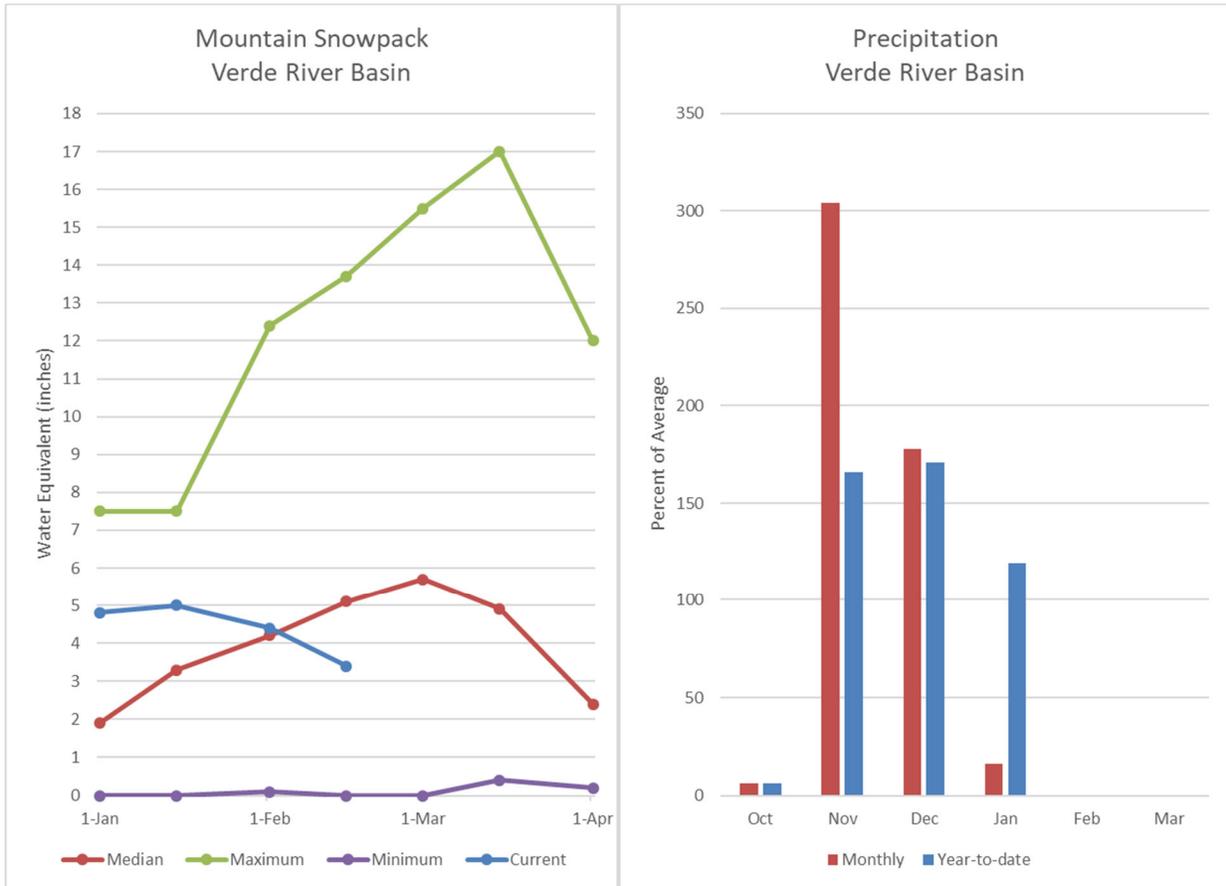
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage Middle of January, 2020	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Salt River Reservoir System	1586.6	1086.5	1272.0	2025.8
Basin-wide Total	1586.6	1086.5	1272.0	2025.8
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2020	# of Sites	% Median	Last Year % Median
SALT RIVER BASIN	7	81%	61%

VERDE RIVER BASIN as of February 15, 2020

Normal streamflow levels are forecast for the basin. In the Verde River above Horseshoe Dam, the forecast calls for 98% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 76% of median.



Verde River Basin Streamflow Forecasts - February 16, 2020

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

VERDE RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Verde R bl Tangle Ck ab Horseshoe Dam ³	FEB			27	77%			35
	F15-MAY	46	84	120	98%	165	250	123

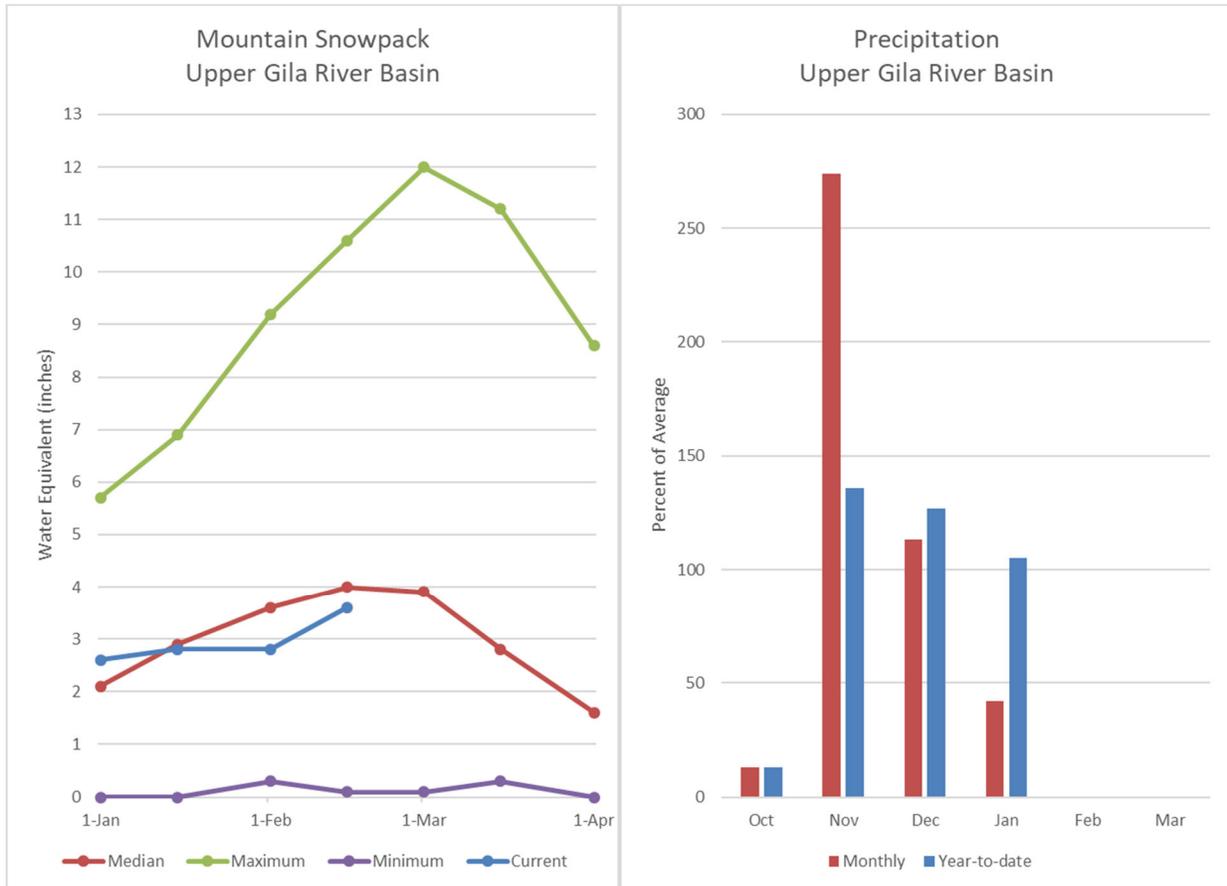
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage Middle of January, 2020	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Verde River Reservoir System	176.9	184.1	160.8	287.4
Basin-wide Total	176.9	184.1	160.8	287.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2020	# of Sites	% Median	Last Year % Median
VERDE RIVER BASIN	5	76%	82%

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

Below normal streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 83% of median streamflow levels through May. In the Gila River, near Solomon, the forecast calls for 83% of median streamflow levels through May. At San Carlos Reservoir, inflow to the lake is forecast at 104% of median through May. Snow survey measurements show the snowpack for this basin to be at 91% of median.



San Francisco-Upper Gila River Basin Streamflow Forecasts - February 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	F15-MAY	19.3	29	37	90%	47	63	41
Gila R bl Blue Ck nr Virden ³	F15-MAY	17.4	33	46	87%	61	88	53
San Francisco R at Glenwood ³	F15-MAY	6.2	11.5	16.5	98%	23	34	16.8
San Francisco R at Clifton ³	F15-MAY	29	47	38	83%	78	105	46
Gila R nr Solomon ³	FEB			18	78%			23
San Carlos Reservoir Inflow ³	F15-MAY	55	92	85	83%	158	220	103
	F15-MAY	10.4	40	70	104%	109	182	67

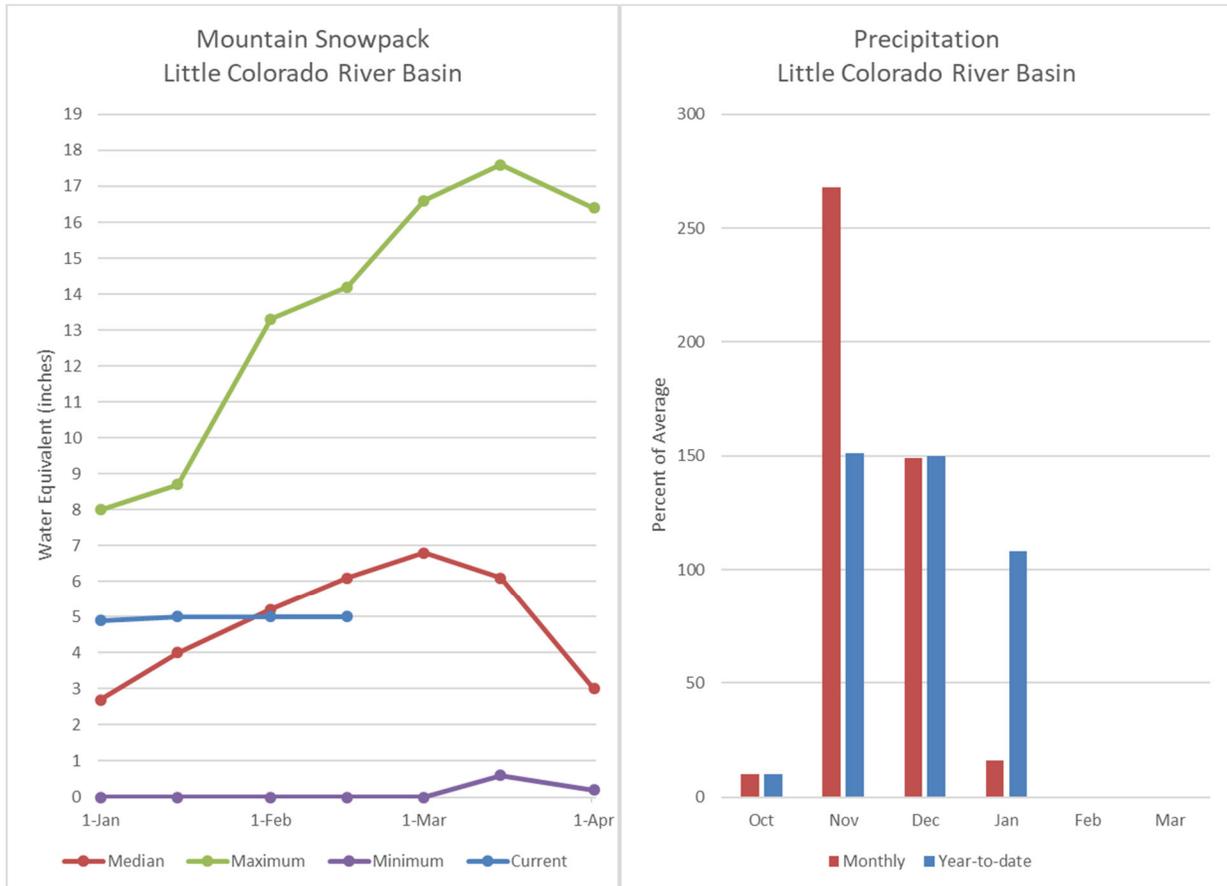
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage Middle of January, 2020	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
San Carlos Reservoir	88.8	42.6	385.7	875.0
Basin-wide Total	88.8	42.6	385.7	875.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2020	# of Sites	% Median	Last Year % Median
SAN FRANCISCO-UPPER GILA RIVER BASIN	7	91%	49%

LITTLE COLORADO RIVER BASIN as of February 15, 2020

Well below normal streamflow levels are forecast for the basin. In the Little Colorado River, above Lyman Lake, the forecast calls for 73% of median streamflow through June. At Blue Ridge (C.C. Cragin) Reservoir, inflow to the lake is forecast at 63% of median through May. Snowpacks along the southern headwaters of the Little Colorado River, and along the central Mogollon Rim, were measured at 85% and 71% of median, respectively.



Little Colorado River Basin Streamflow Forecasts - February 16, 2020

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

LITTLE COLORADO RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Little Colorado R ab Lyman Lake ³	FEB-JUN	2.1	3.6	4.8	73%	6.3	9	6.6
Blue Ridge Reservoir Inflow ³	FEB-MAY	3.2	6.8	10.3	63%	15	24	16.3
Lake Mary Reservoir Inflow ³	FEB-MAY	1.38	2.4	3.4	79%	4.6	6.8	4.3

- 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
- 3) Median value used in place of average

Reservoir Storage Middle of January, 2020	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lyman Reservoir	8.7	3.6	12.3	30.0
Basin-wide Total	8.7	3.6	12.3	30.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2020	# of Sites	% Median	Last Year % Median
LITTLE COLORADO RIVER BASIN	5	85%	82%
CENTRAL MOGOLLON RIM	3	71%	73%

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

Snowpack Summary for February 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	21	7.8	7.5	104%	7.2	96%	
Beaver Head	SNOTEL	7990	3	1.3	3.6	36%	0.4	11%	
Buck Spring	SC	7400			2.8		0.2	7%	
Coronado Trail	SNOTEL	8400	6	2.9	2.9	100%	0.8	28%	
Hawley Lake	SNOTEL	8300	34	10.5			11.1		
Coronado Trail	SC	8350			2.2		0.0	0%	
Fort Apache	SC	9160			7.1		6.9	97%	
Hannagan Meadows	SNOTEL	9020	29	9.9	9.6	103%	7.8	81%	
Maverick Fork	SNOTEL	9200	25	8.0	7.9	101%	7.4	94%	
Nutrioso	SC	8500			1.0		0.0	0%	
Nutrioso	SNOTEL	8500	1	0.3			0.0		
Wildcat	SNOTEL	7850	7	2.9	3.4	85%	1.1	32%	
Workman Creek	SNOTEL	6900	0	0.0	5.8	0%	0.0	0%	
Basin Index						81%		61%	
# of sites						7		7	
VERDE RIVER BASIN		Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	10	3.5	5.2	67%	2.8	54%	
Baker Butte No. 2	SC	7700			8.3		7.9	95%	
Baker Butte Smt	SNOTEL	7700	33	11.0			8.9		
Bar M	SNOTEL	6393	0	0.0			0.3		
Chalender	SC	7100			2.0		1.0	50%	
Chalender	SNOTEL	7100	9	4.0			2.9		
Fort Valley	SC	7350			2.2		1.4	64%	
Fort Valley	SNOTEL	7350	0	0.0			0.4		
Fry	SNOTEL	7200	23	8.4	6.3	133%	6.2	98%	
Happy Jack	SNOTEL	7630	10	4.0	5.3	75%	5.2	98%	
Happy Jack	SC	7630			4.8		1.9	40%	
Mormon Mountain	SNOTEL	7500	5	2.0	4.3	47%	4.0	93%	
Mormon Mountain Summit #2	SC	8470			7.8		10.4	133%	
Mormon Mtn Summit	SNOTEL	8500	21	6.5			8.7		
Newman Park	SC	6750			2.6		1.4	54%	
White Horse Lake	SNOTEL	7180	3	1.5	4.5	33%	2.8	62%	
Williams Ski Run	SC	7720			7.5		8.7	116%	
Basin Index						76%		82%	
# of sites						5		5	
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			14.9		12.8	86%	
Snowslide Canyon	SNOTEL	9730	39	15.5	12.5	124%	20.8	166%	
Basin Index						124%		166%	
# 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	3	1.3	3.6	36%	0.4	11%	
Coronado Trail	SNOTEL	8400	6	2.9	2.9	100%	0.8	28%	
Coronado Trail	SC	8350			2.2		0.0	0%	
Frisco Divide	SNOTEL	8000	10	3.8	2.9	131%	0.7	24%	
Hannagan Meadows	SNOTEL	9020	29	9.9	9.6	103%	7.8	81%	
Hummingbird - Aerial And Snow Course	SC	10550							
Lookout Mountain	SNOTEL	8500	4	1.3	2.5	52%	0.0	0%	

Nutrioso	SC	8500				1.0		0.0	0%
Nutrioso	SNOTEL	8500	1	0.3				0.0	
Signal Peak	SNOTEL	8360	2	0.5		4.1	12%	0.0	0%
Silver Creek Divide	SNOTEL	9000	29	10.3		7.4	139%	6.5	88%
State Line	SC	8000				2.0			
Whitewater - Aerial And Snow Course	SC	10750							

Basin Index **91%** **49%**
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	10	3.5	5.2	67%	2.8	54%
Baker Butte No. 2	SC	7700			8.3		7.9	95%
Baker Butte Smt	SNOTEL	7700	33	11.0			8.9	
Baldy	SNOTEL	9125	21	7.8	7.5	104%	7.2	96%
Buck Spring	SC	7400			2.8		0.2	7%
Cheese Springs	SC	8700			5.0		4.5	90%
Fort Apache	SC	9160			7.1		6.9	97%
Heber	SNOTEL	7640	8	3.7	5.1	73%	3.4	67%
Lake Mary	SC	6930			2.6		1.6	62%
Maverick Fork	SNOTEL	9200	25	8.0	7.9	101%	7.4	94%
Promontory	SNOTEL	7930	18	6.9	9.5	73%	8.2	86%

Basin Index **85%** **82%**
of sites 5 5

CENTRAL MOGOLLON RIM	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	10	3.5	5.2	67%	2.8	54%
Baker Butte No. 2	SC	7700			8.3		7.9	95%
Baker Butte Smt	SNOTEL	7700	33	11.0			8.9	
Heber	SNOTEL	7640	8	3.7	5.1	73%	3.4	67%
Promontory	SNOTEL	7930	18	6.9	9.5	73%	8.2	86%

Basin Index **71%** **73%**
of sites 3 3

CHUSKA MOUNTAINS	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Beaver Spring	SC	9220			8.5		9.0	106%
Beaver Spring	SNOTEL	9200	25	8.2			9.7	
Bowl Canyon	SC	8980			7.2		8.9	124%
Hidden Valley	SC	8480					8.3	
Missionary Spring	SC	7940			4.0		4.0	100%
Tsaile Canyon #1	SC	8160			6.0		8.3	138%
Tsaile Canyon #3	SC	8920			9.0		9.7	108%
Whiskey Creek	SC	9050			8.0		9.9	124%
Navajo Whiskey Ck	SNOTEL	9050	25	4.8			9.7	

Basin Index **0** **0**
of sites 0 0

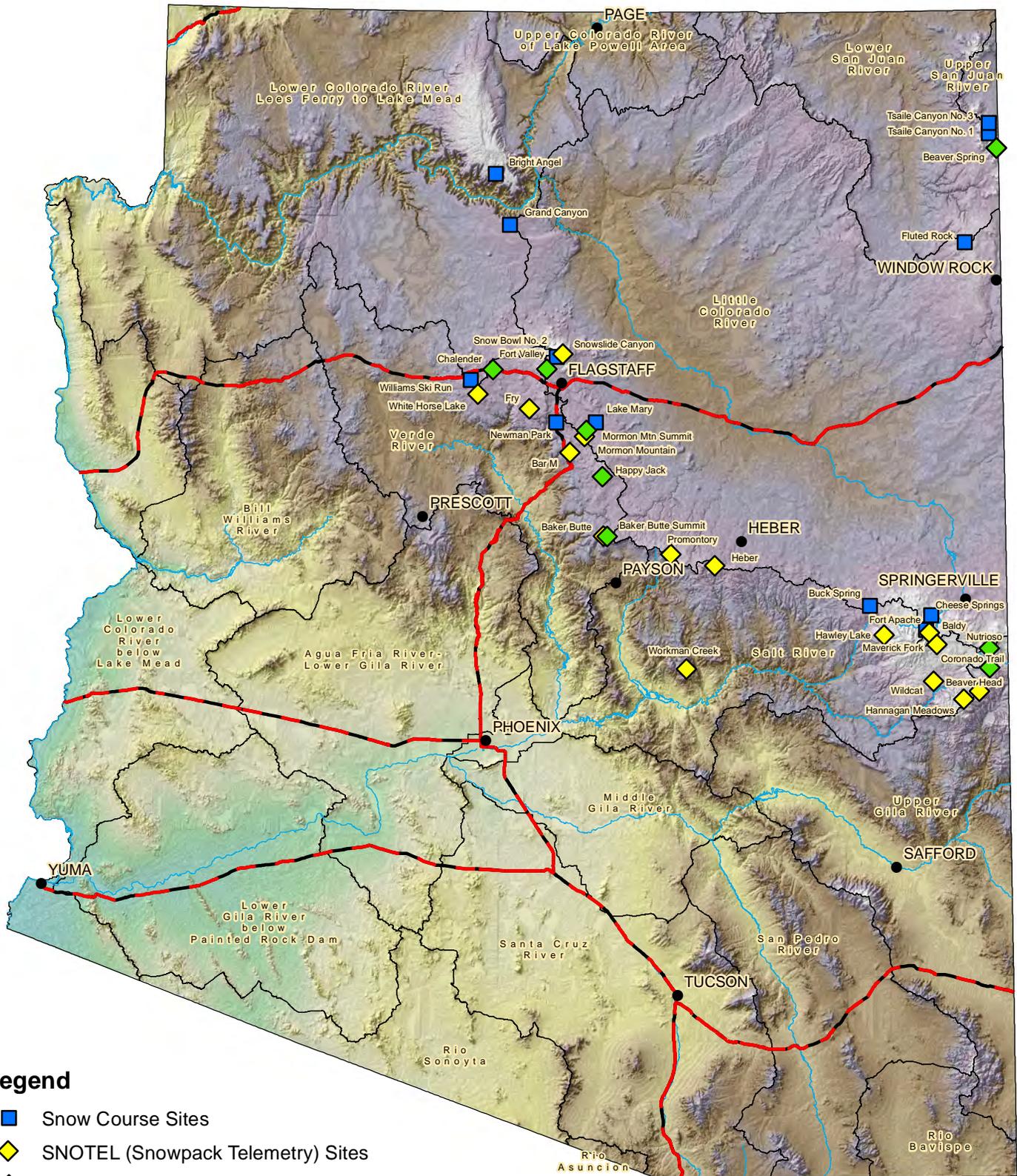
DEFIANCE PLATEAU	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Fluted Rock	SC	7800			3.7		4.1	111%

Basin Index **0** **0**
of sites 0 0

NORTHWESTERN ARIZONA	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Bright Angel	SC	8400			6.6		9.0	136%
Grand Canyon	SC	7500			1.7			

Basin Index **0** **0**
of sites 0 0

Arizona Snow Survey Data Sites



Legend

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

