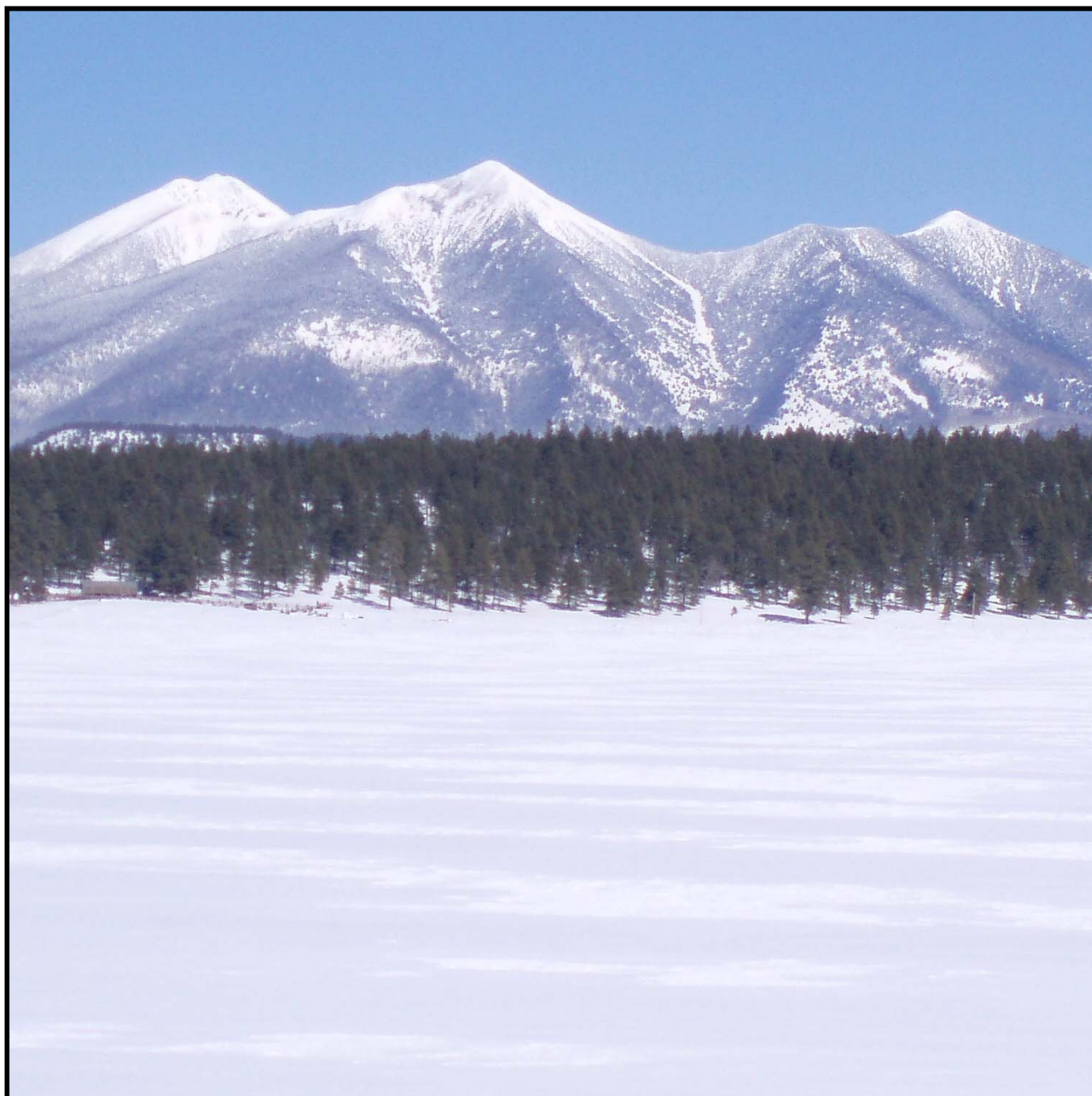




United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Arizona Basin Outlook Report January 1, 2019



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 January 1, 2019

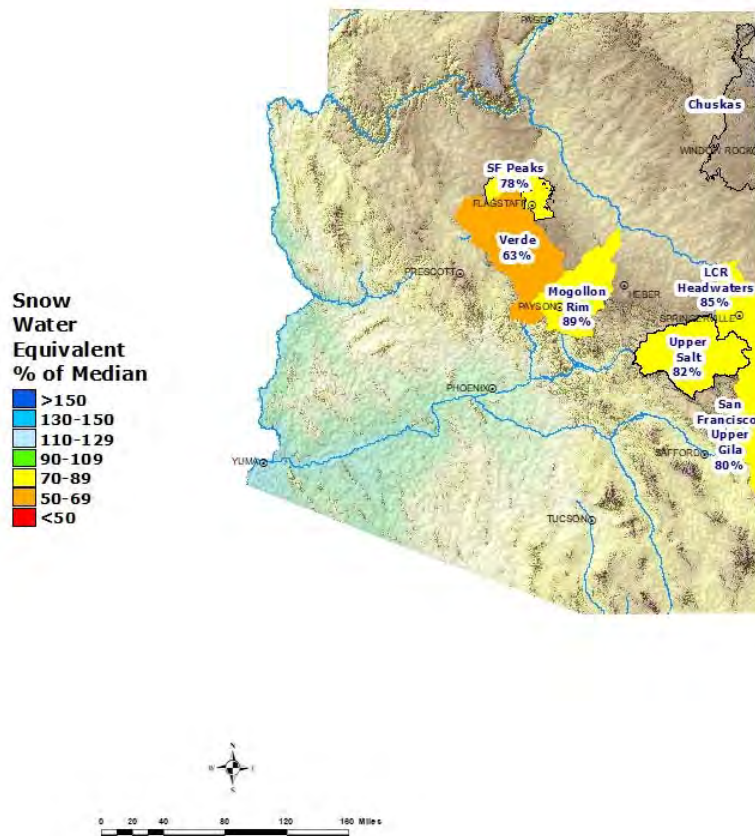
SUMMARY

As of January 1, snowpack levels are well below to below normal throughout the major basins of the state. Precipitation for the month of December ranged from well below normal to below normal in the major river basins. The Salt and Verde River reservoir system stands at 47 percent of capacity, while San Carlos Reservoir is at 2 percent of capacity. The forecast calls for normal runoff in the Salt and Verde basins for the spring runoff period.

SNOWPACK

Snow water equivalent levels in the state's major river basins are well below normal to below normal, ranging from 85 percent of median in the Little Colorado River Basin to 63 percent of median in the Verde River Basin. The statewide snowpack is below normal at 79 percent of median.

**Arizona
Snow Water Equivalent
as of January 1, 2019**

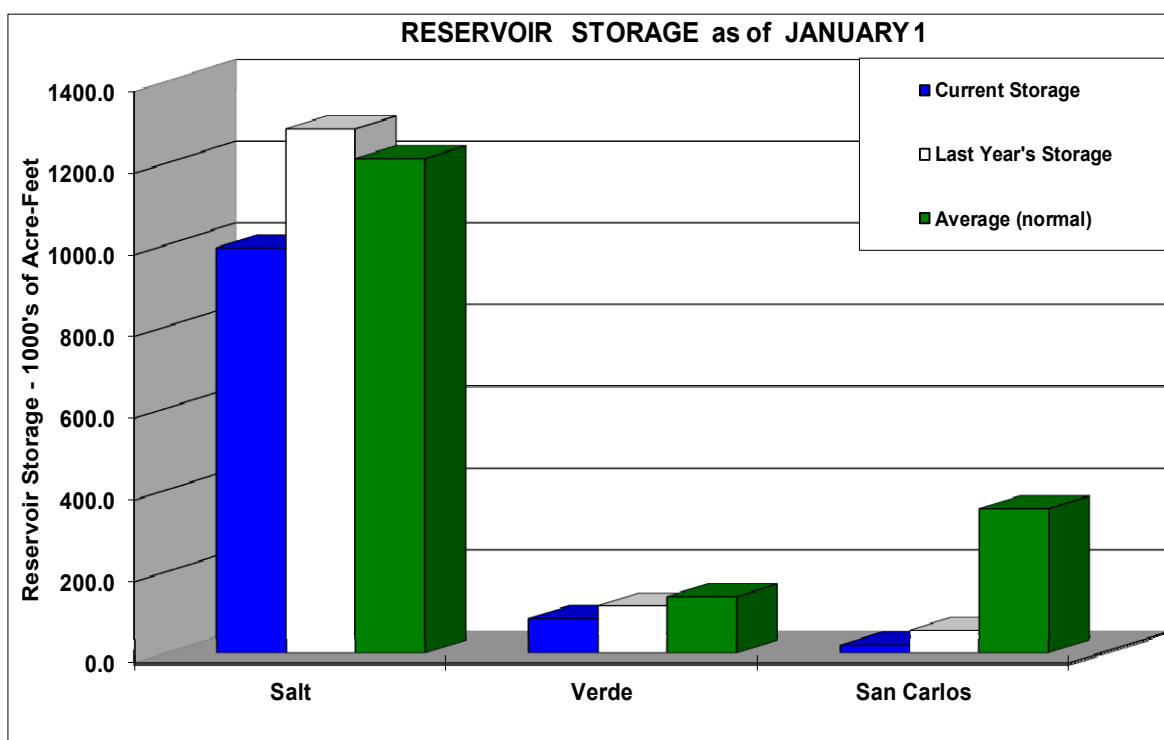


PRECIPITATION

Mountain data from NRCS SNOTEL sites and NWS Cooperator gages show that precipitation for December was well below average to below average in the major river basins. Cumulative precipitation since October 1 ranged from below normal to 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 1, the Salt and Verde River reservoir system stands at 47 percent of capacity. San Carlos Reservoir is currently at 2 percent of capacity.



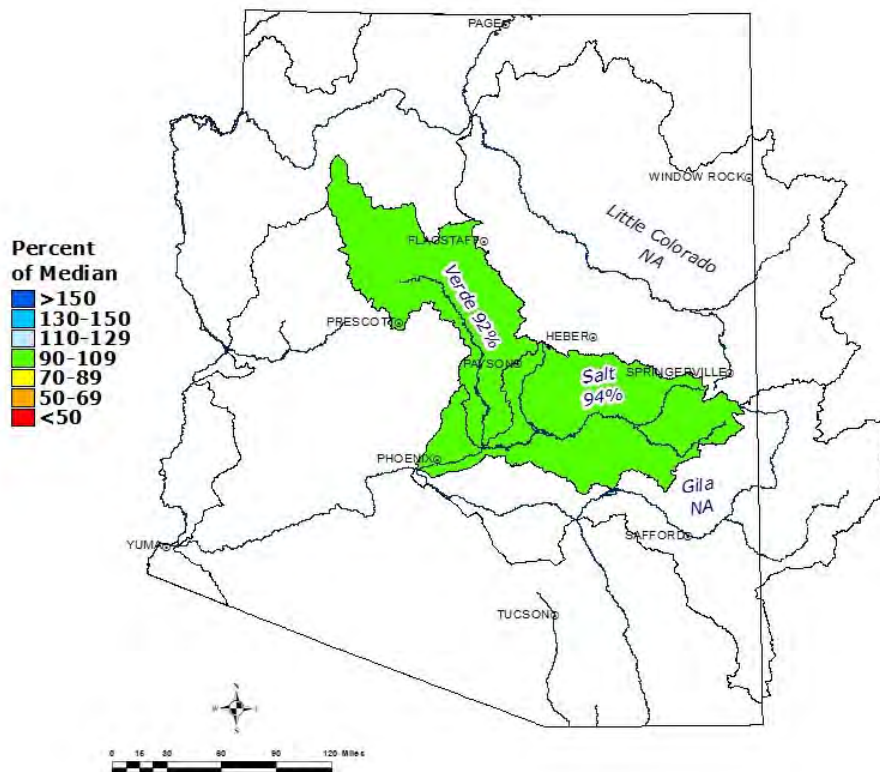
Key storage volumes displayed in thousands of acre-feet (x1000):

<u>Reservoir</u>	<u>Current Storage</u>	<u>Last Year Storage</u>	<u>30-Year Average</u>	<u>Storage Capacity</u>
Salt River System	994.0	1284.9	1181.0	2025.8
Verde River System	86.2	117.4	135.7	287.4
San Carlos Reservoir	19.5	57.3	324.9	875.0
Lyman Lake	3.7	11.2	11.8	30.0
Lake Havasu	552.4	557.6	562.7	619.0
Lake Mohave	1638.7	1636.5	1602.0	1810.0
Lake Mead	10132.0	10221.0	20297.0	26159.0
Lake Powell	10099.0	14055.8	17745.0	24322.0

STREAMFLOW

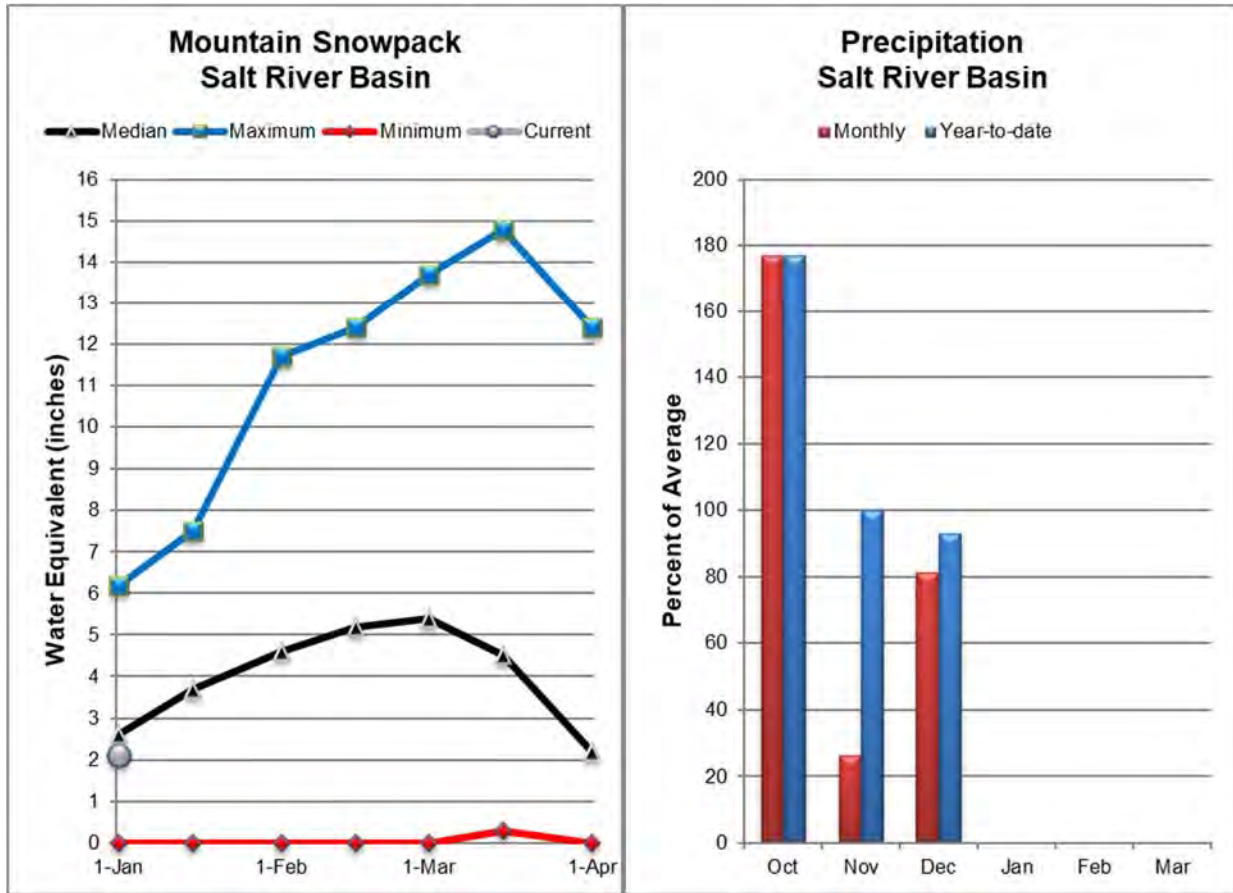
As of January 1, the forecast calls for normal streamflow for the spring runoff period in the Salt and Verde River Basins, ranging from 92 percent of median in the Verde River above Horseshoe Dam to 94 percent of median in the Salt River near Roosevelt. Total precipitation since the beginning of the water year has been near normal, resulting in improved soil conditions for runoff. Please refer to the basin forecast tables found in this report for more information regarding water supply forecasts. **Due to current staffing, most official forecasts only will be available February through May. If you rely on the January forecasts, please contact Travis Kolling, travis.kolling@az.usda.gov, or Cara McCarthy, cara.s.mccarthy@por.usda.gov.**

Arizona Spring Streamflow Forecasts as of January 1, 2019



SALT RIVER BASIN as of January 1, 2019

Slightly below normal to normal streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 94% of median streamflow through May, while at Tonto Creek, the forecast calls for 88% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 82% of median.



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Salt River Basin Streamflow Forecasts - January 1, 2019

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	JAN	2.5	11.3	23	96%	41	81	24
	JAN-MAY	110	205	290	94%	400	605	310
	MAR-MAY	97	164	225	94%	300	435	240
Tonto Ck ab Gun Ck nr Roosevelt ³	JAN	0.62	1.74	3.5	92%	7	19.7	3.8
	JAN-MAY	4.6	18.8	37	88%	64	125	42

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

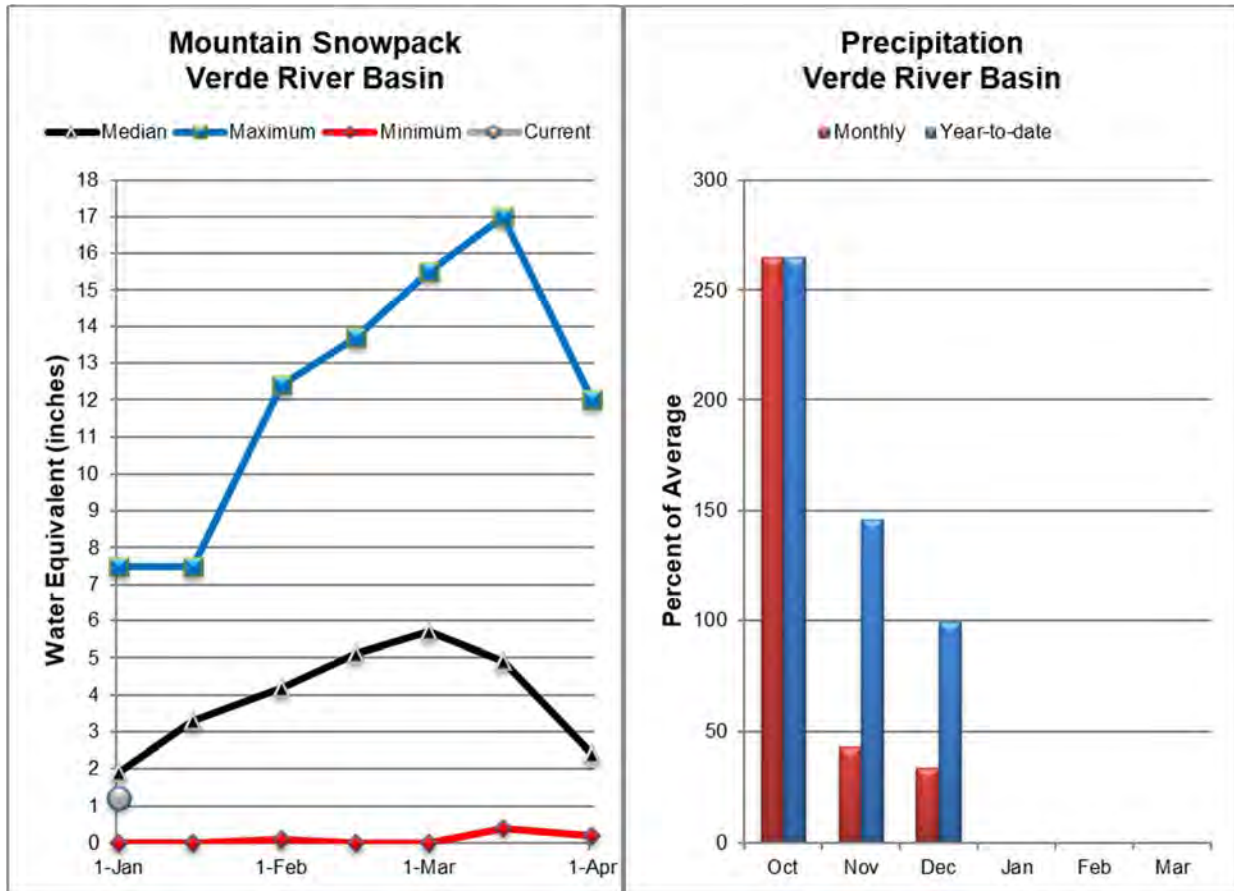
3) Median value used in place of average

Reservoir Storage End of December, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Salt River Reservoir System	994.0	1284.9	1181.0	2025.8
Basin-wide Total	994.0	1284.9	1181.0	2025.8
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
SALT RIVER BASIN	7	82%	2%

VERDE RIVER BASIN as of January 1, 2019

Normal streamflow levels are forecast for the basin. In the Verde River above Horseshoe Dam, the forecast calls for 92% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 63% of median.



Verde River Basin Streamflow Forecasts - January 1, 2019

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	JAN	8.1	14.3	21	91%	31	54	23
	JAN-MAY	59	101	145	92%	210	355	157

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

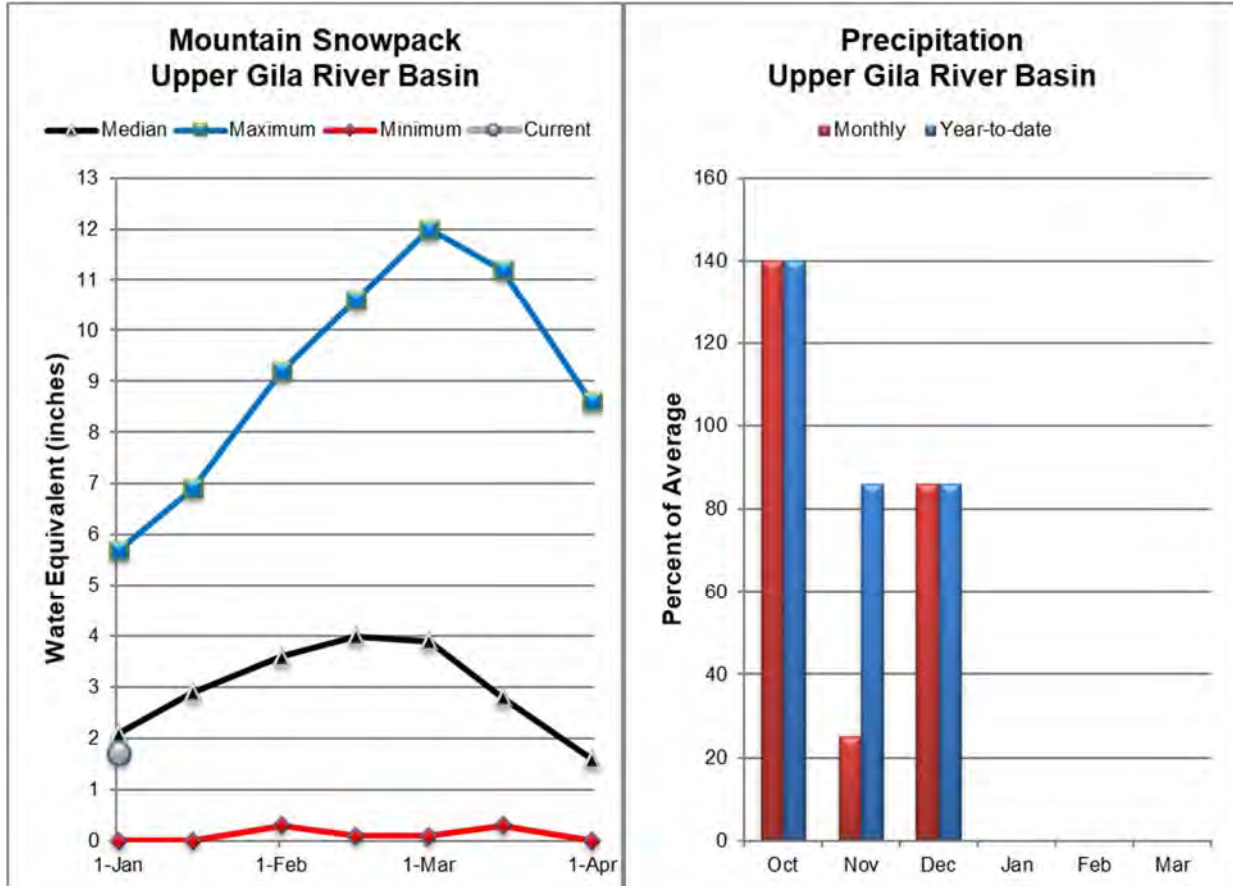
3) Median value used in place of average

Reservoir Storage End of December, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Verde River Reservoir System	86.2	117.4	135.7	287.4
Basin-wide Total	86.2	117.4	135.7	287.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
VERDE RIVER BASIN	5	63%	0%

SAN FRANCISCO-UPPER GILA RIVER BASIN as of January 1, 2019

Snow survey measurements show the snowpack for this basin to be at 80% of median. **Due to current staffing, most official forecasts only will be available February through May. If you rely on the January forecasts, please contact Travis Kolling, travis.kolling@az.usda.gov, or Cara McCarthy, cara.s.mccarthy@por.usda.gov.**



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San Francisco-Upper Gila River Basin Streamflow Forecasts - January 1, 2019

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								
Gila R bl Blue Ck nr Virden ³								
San Francisco R at Glenwood ³								
San Francisco R at Clifton ³								
Gila R nr Solomon ³								
San Carlos Reservoir Inflow ³								

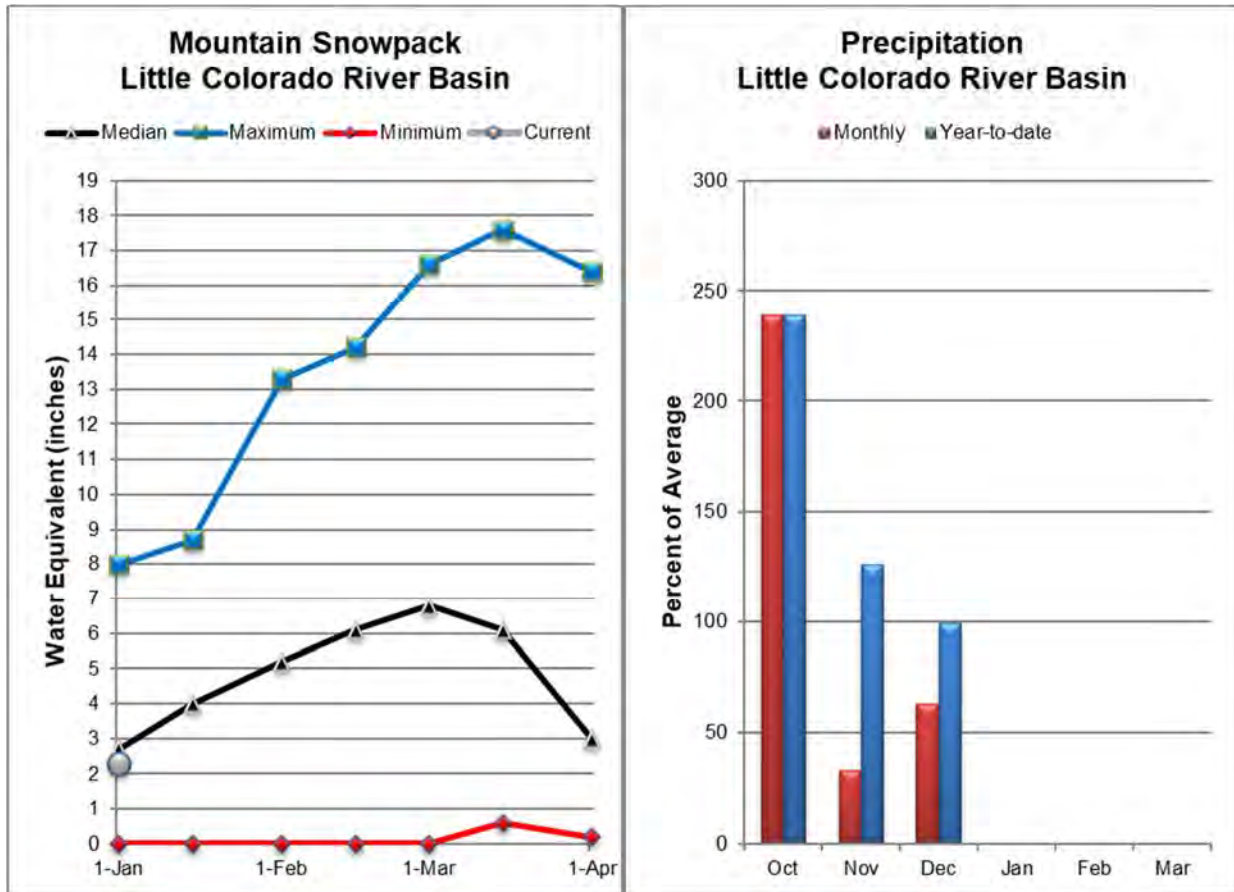
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
 3) Median value used in place of average

Reservoir Storage End of December, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
San Carlos Reservoir	19.5	57.3	324.9	875.0
Basin-wide Total	19.5	57.3	324.9	875.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
SAN FRANCISCO-UPPER GILA RIVER BASIN	7	80%	6%

LITTLE COLORADO RIVER BASIN as of January 1, 2019

Snowpacks along the southern headwaters of the Little Colorado River, and along the central Mogollon Rim, were measured at 85% and 89% of median, respectively. **Due to current staffing, most official forecasts only will be available February through May. If you rely on the January forecasts, please contact Travis Kolling, travis.kolling@az.usda.gov, or Cara McCarthy, cara.s.mccarthy@por.usda.gov.**



Little Colorado River Basin Streamflow Forecasts - January 1, 2019

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								
Rio Nutria nr Ramah ³								
Zuni R ab Black Rock Reservoir ³								
Blue Ridge Reservoir Inflow ³								
Lake Mary Reservoir Inflow 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 End of December, 2018	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lyman Reservoir	3.7	11.2	11.8	30.0
Basin-wide Total	3.7	11.2	11.8	30.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 1, 2019	# of Sites	% Median	Last Year % Median
LITTLE COLORADO RIVER BASIN	5	85%	0%
CENTRAL MOGOLLON RIM	3	89%	0%

Basinwide Summary: January 1, 2019
(Averages/Medians based on 1981-2010 reference period)

Snowpack Summary for January 1, 2019

SALT RIVER BASIN	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baldy	SNOTEL	9125	18	3.6	3.7	97%	0.0	0%
Beaver Head	SNOTEL	7990	14	1.8	2.7	67%	0.0	0%
Buck Spring	SC	7400			1.5		0.0	0%
Coronado Trail	SNOTEL	8400	7	1.3	1.8	72%	0.0	0%
Hawley Lake	SNOTEL	8300	30	5.6			0.0	
Coronado Trail	SC	8350			0.7		0.0	0%
Fort Apache	SC	9160			3.7		0.0	0%
Hannagan Meadows	SNOTEL	9020	26	4.3	5.0	86%	0.4	8%
Maverick Fork	SNOTEL	9200	23	2.7	4.0	68%	0.0	0%
Nutriosio	SC	8500			0.4		0.0	0%
Nutriosio	SNOTEL	8500	3	0.8			0.0	
Wildcat	SNOTEL	7850	11	1.3	1.3	100%	0.0	0%
Workman Creek	SNOTEL	6900	14	1.7	1.9	89%	0.0	0%
Basin Index						82%		2%
# 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	8	1.0	1.6	63%	0.0	0%
Baker Butte No. 2	SC	7700			3.4		0.0	0%
Baker Butte Smt	SNOTEL	7700	15	2.5			0.0	
Bar M	SNOTEL	6393	4	0.8			0.0	
Chalender	SC	7100			0.6		0.0	0%
Chalender	SNOTEL	7100	7	1.2			0.0	
Fort Valley	SC	7350			0.8		0.0	0%
Fort Valley	SNOTEL	7350	3	0.3			0.0	
Fry	SNOTEL	7200	10	2.3	2.8	82%	0.0	0%
Happy Jack	SNOTEL	7630	13	1.8	1.7	106%	0.0	0%
Happy Jack	SC	7630			1.0		0.0	0%
Mormon Mountain	SNOTEL	7500	5	0.8	1.8	44%	0.0	0%
Mormon Mountain Summit #2	SC	8470			3.6		0.0	0%
Mormon Mtn Summit	SNOTEL	8500	11	2.4			0.0	
Newman Park	SC	6750			0.6		0.0	0%
White Horse Lake	SNOTEL	7180	0	0.0	1.4	0%	0.0	0%
Williams Ski Run	SC	7720			2.6		0.0	0%
Basin Index						63%		0%
# 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			8.0		0.2	3%
Snowslide Canyon	SNOTEL	9730	24	6.3	8.1	78%	0.0	0%
Basin Index						78%		0%
# 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	14	1.8	2.7	67%	0.0	0%
Coronado Trail	SNOTEL	8400	7	1.3	1.8	72%	0.0	0%
Coronado Trail	SC	8350			0.7		0.0	0%
Frisco Divide	SNOTEL	8000	8	0.9	1.5	60%	0.0	0%
Hannagan Meadows	SNOTEL	9020	26	4.3	5.0	86%	0.4	8%
Hummingbird - Aerial And Snow Course	SC	10550			4.4			

Lookout Mountain	SNOTEL	8500	5	0.8	1.4	57%	0.3	21%
Nutriosio	SC	8500			0.4		0.0	0%
Nutriosio	SNOTEL	8500	3	0.8			0.0	
Signal Peak	SNOTEL	8360	8	1.0	1.9	53%	0.0	0%
Silver Creek Divide	SNOTEL	9000	18	4.1	3.5	117%	0.4	11%
State Line	SC	8000			0.6		0.0	0%
Whitewater - Aerial And Snow Course	SC	10750			9.5			

Basin Index **80%** **6%**
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	8	1.0	1.6	63%	0.0	0%
Baker Butte No. 2	SC	7700			3.4		0.0	0%
Baker Butte Smt	SNOTEL	7700	15	2.5			0.0	
Baldy	SNOTEL	9125	18	3.6	3.7	97%	0.0	0%
Buck Spring	SC	7400			1.5		0.0	0%
Cheese Springs	SC	8700			2.8		0.0	0%
Fort Apache	SC	9160			3.7		0.0	0%
Heber	SNOTEL	7640	13	1.8	1.6	113%	0.0	0%
Lake Mary	SC	6930			1.0		0.0	0%
Maverick Fork	SNOTEL	9200	23	2.7	4.0	68%	0.0	0%
Promontory	SNOTEL	7930	17	3.0	3.3	91%	0.0	0%

Basin Index **85%** **0%**
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	8	1.0	1.6	63%	0.0	0%
Baker Butte No. 2	SC	7700			3.4		0.0	0%
Baker Butte Smt	SNOTEL	7700	15	2.5			0.0	
Heber	SNOTEL	7640	13	1.8	1.6	113%	0.0	0%
Promontory	SNOTEL	7930	17	3.0	3.3	91%	0.0	0%

Basin Index **89%** **0%**
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			3.9		0.4	10%
Beaver Spring	SNOTEL	9200	26	3.5			0.0	
Bowl Canyon	SC	8980			3.5		0.0	0%
Hidden Valley	SC	8480					0.0	
Missionary Spring	SC	7940			1.1		0.0	0%
Tsaile Canyon #1	SC	8160			2.3		0.0	0%
Tsaile Canyon #3	SC	8920			3.8		0.0	0%
Whiskey Creek	SC	9050			3.5		0.0	0%
Navajo Whiskey Ck	SNOTEL	9050	24	3.9			0.0	

Basin Index

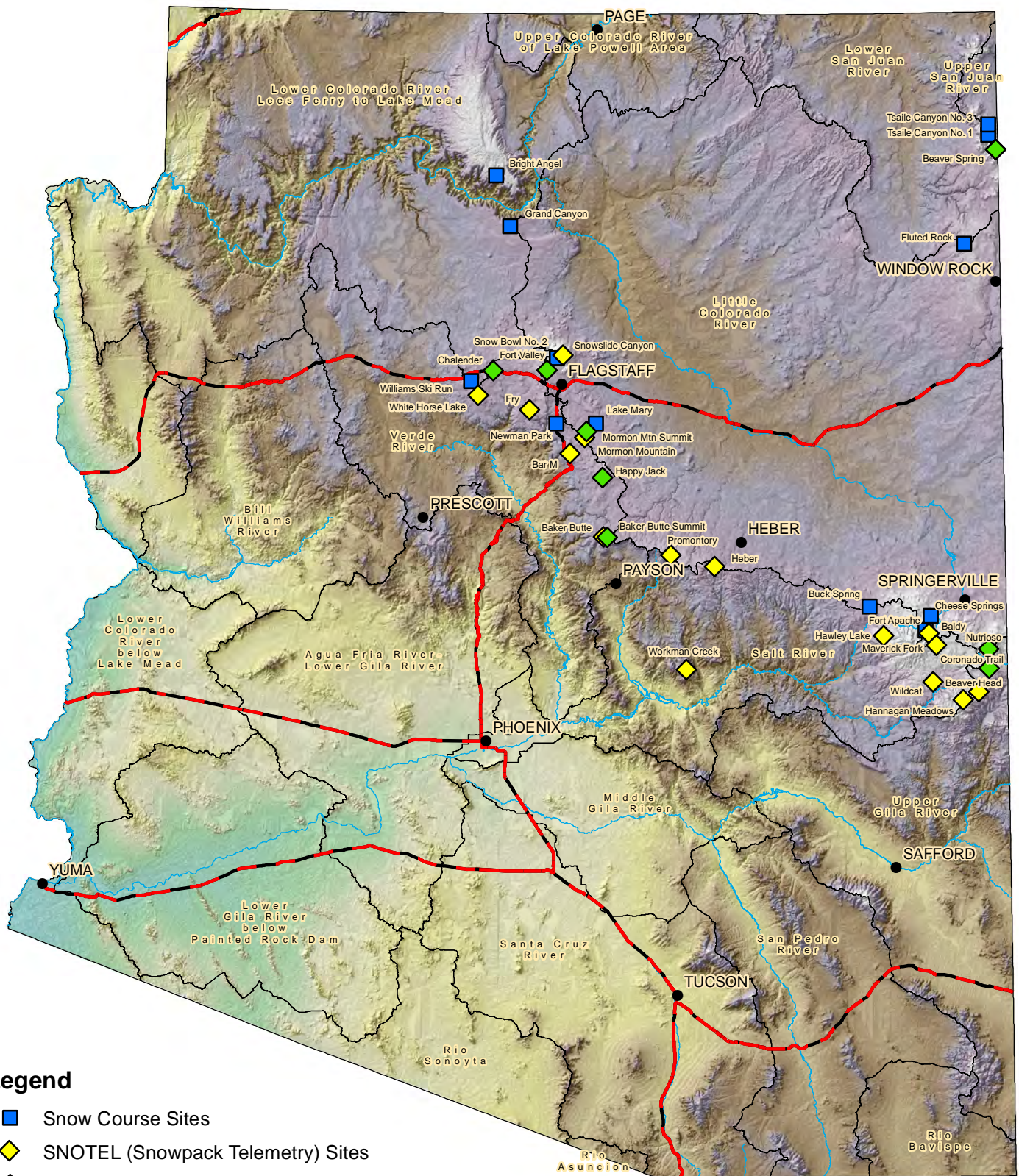
DEFIANCE PLATEAU	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Fluted Rock	SC	7800			1.0		0.0	0%

Basin Index

NORTHWESTERN ARIZONA	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Bright Angel	SC	8400			3.0		0.0	0%
Grand Canyon	SC	7500			0.9		0.0	0%

Basin Index

Arizona Snow Survey Data Sites



Legend

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