



Natural
Resources
Conservation
Service

Arizona

Basin Outlook Report

February 15, 2017



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, 2017

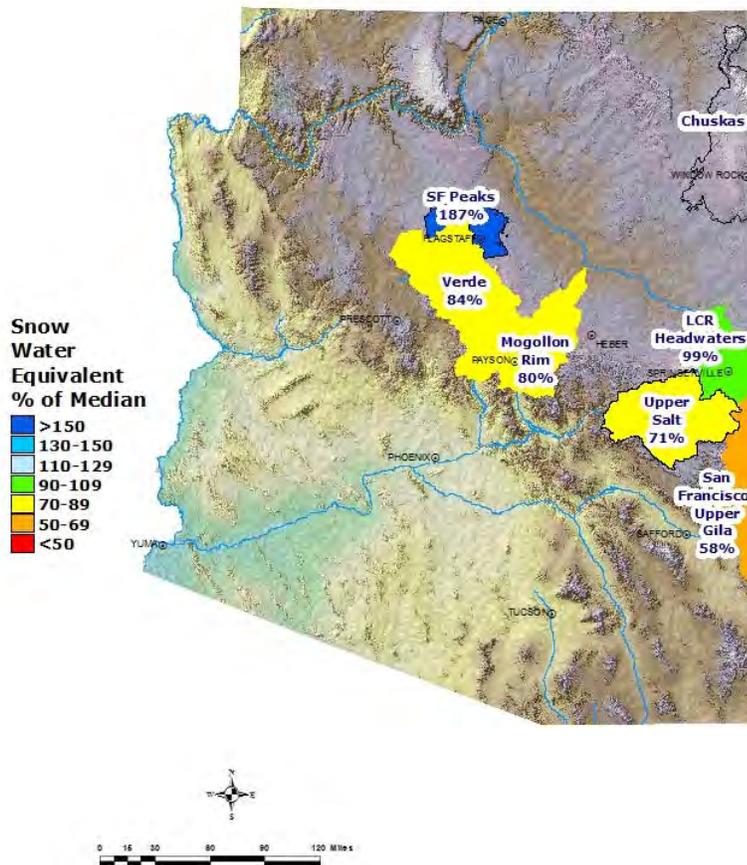
SUMMARY

As of February 15, snowpack levels are normal to below normal throughout the major basins of the state. Precipitation for the first half of February ranged from below normal to well below normal in the major river basins. The Salt and Verde River reservoir system stands at 66 percent of capacity, while San Carlos Reservoir is at 20 percent of capacity. The mid-month forecast calls for above normal to well above normal runoff in the major basins for the spring runoff period.

SNOWPACK

Snow water equivalent levels in the state's major river basins are normal to well below normal, ranging from 99 percent of median in the Little Colorado River Basin to 58 percent of median in the San Francisco-Upper Gila River Basin. The statewide snowpack is normal at 106 percent of median.

**Arizona
Snow Water Equivalent
as of February 15, 2017**

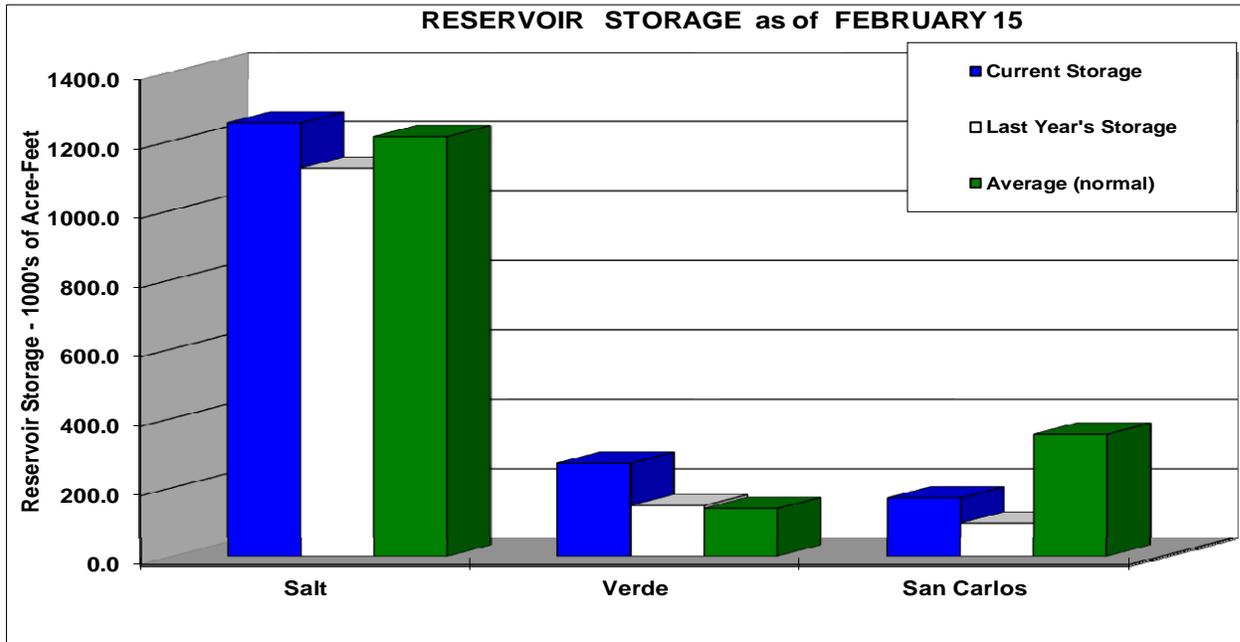


PRECIPITATION

Mountain data from NRCS SNOTEL sites and NWS Cooperator gages show that precipitation for the first half of February was below average to well below average in the major river basins. Cumulative precipitation since October 1 is now above normal to well above normal in 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 66 percent of capacity. San Carlos Reservoir is currently at 20 percent of capacity.



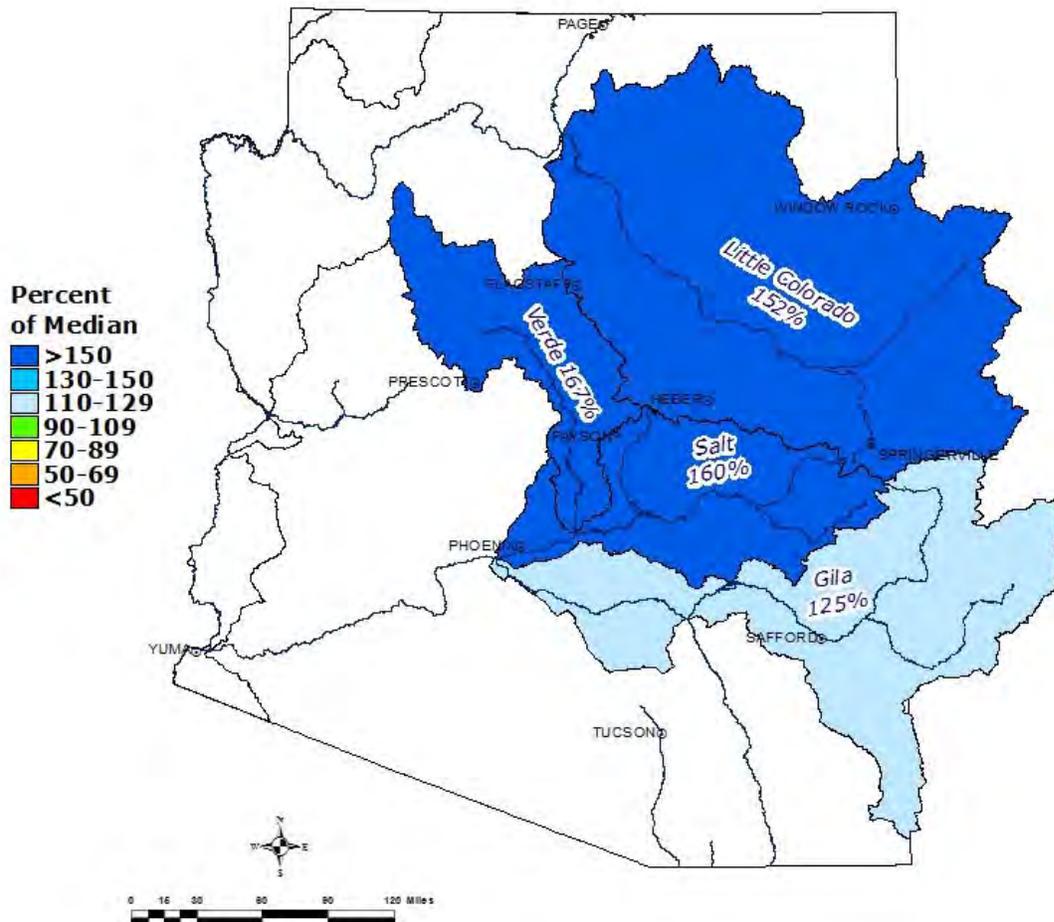
Key storage volumes displayed in thousands of acre-feet (x1000):

<u>Reservoir</u>	<u>Current Storage</u>	<u>Last Year Storage</u>	<u>30-Year Average</u>	<u>Storage Capacity</u>
Salt River System	1251.0	1120.2	1212.0	2025.8
Verde River System	270.8	148.4	140.2	287.4
San Carlos Reservoir	170.8	98.1	355.0	875.0
Lyman Lake	8.5	8.7	12.0	30.0
Lake Havasu	570.9	558.5	561.2	619.0
Lake Mohave	1692.0	1649.0	1659.0	1810.0
Lake Mead	1087.8	10371.0	20361.0	26159.0
Lake Powell	11229.0	11304.0	17553.0	24322.0

STREAMFLOW

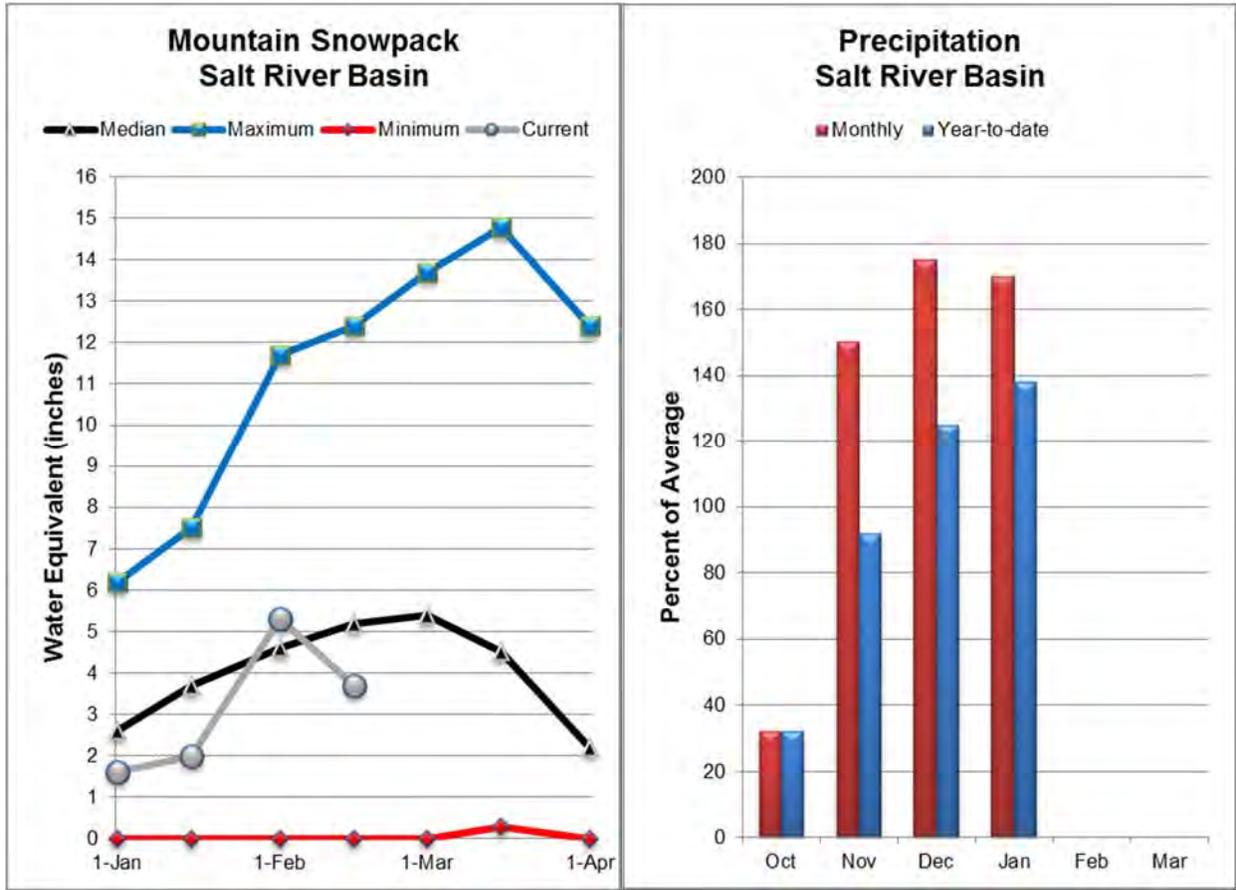
As of February 15, the forecast calls for above normal to well above normal streamflow for the spring runoff period, ranging from 125 percent of median in the Gila River near Solomon to 167 percent of median in the Verde River above Horseshoe Dam. Many of the major streams in the state are currently flowing at well above normal levels due to the above average temperatures during the first half of the month. 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, 2017



SALT RIVER BASIN as of February 15, 2017

Well above normal streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 160% of median streamflow through May, while at Tonto Creek, the forecast calls for 159% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 71% of median.



**Salt River Basin
Streamflow Forecasts - February 16, 2017**

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			110	282%			39
	MAR-MAY	200	290	360	150%	440	585	240
	F15-MAY	245	340	415	160%	500	650	260
Tonto Ck ab Gun Ck nr Roosevelt ³	FEB			24	233%			10.3
	F15-MAY	17.1	31	43	159%	59	88	27

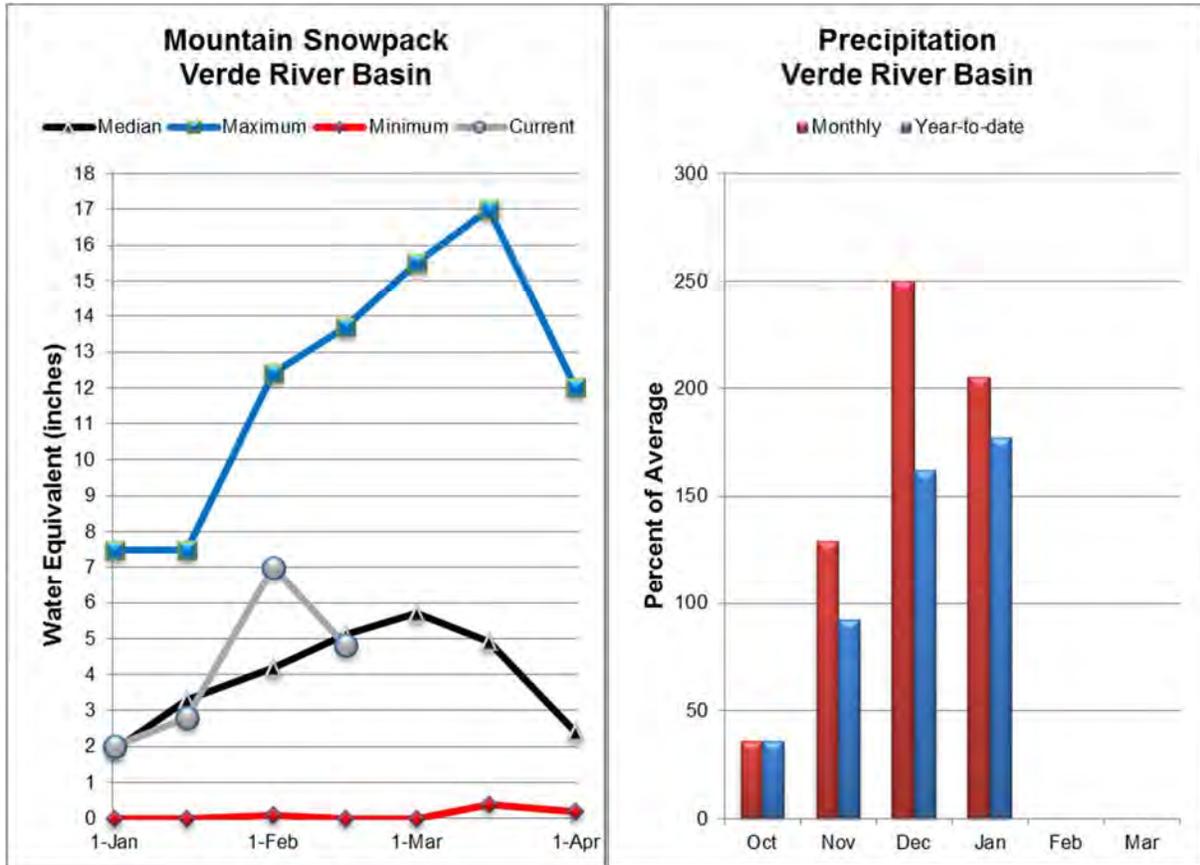
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage Middle of January, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Salt River Reservoir System	1251.0	1120.2	1272.0	2025.8
Basin-wide Total	1251.0	1120.2	1272.0	2025.8
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2017	# of Sites	% Median	Last Year % Median
SALT RIVER BASIN	11	71%	75%

VERDE RIVER BASIN as of February 15, 2017

Well above normal streamflow levels are forecast for the basin. In the Verde River above Horseshoe Dam, the forecast calls for 167% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 84% of median.



Verde River Basin Streamflow Forecasts - February 16, 2017

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			105	300%			35
	F15-MAY	94	154	205	167%	270	385	123

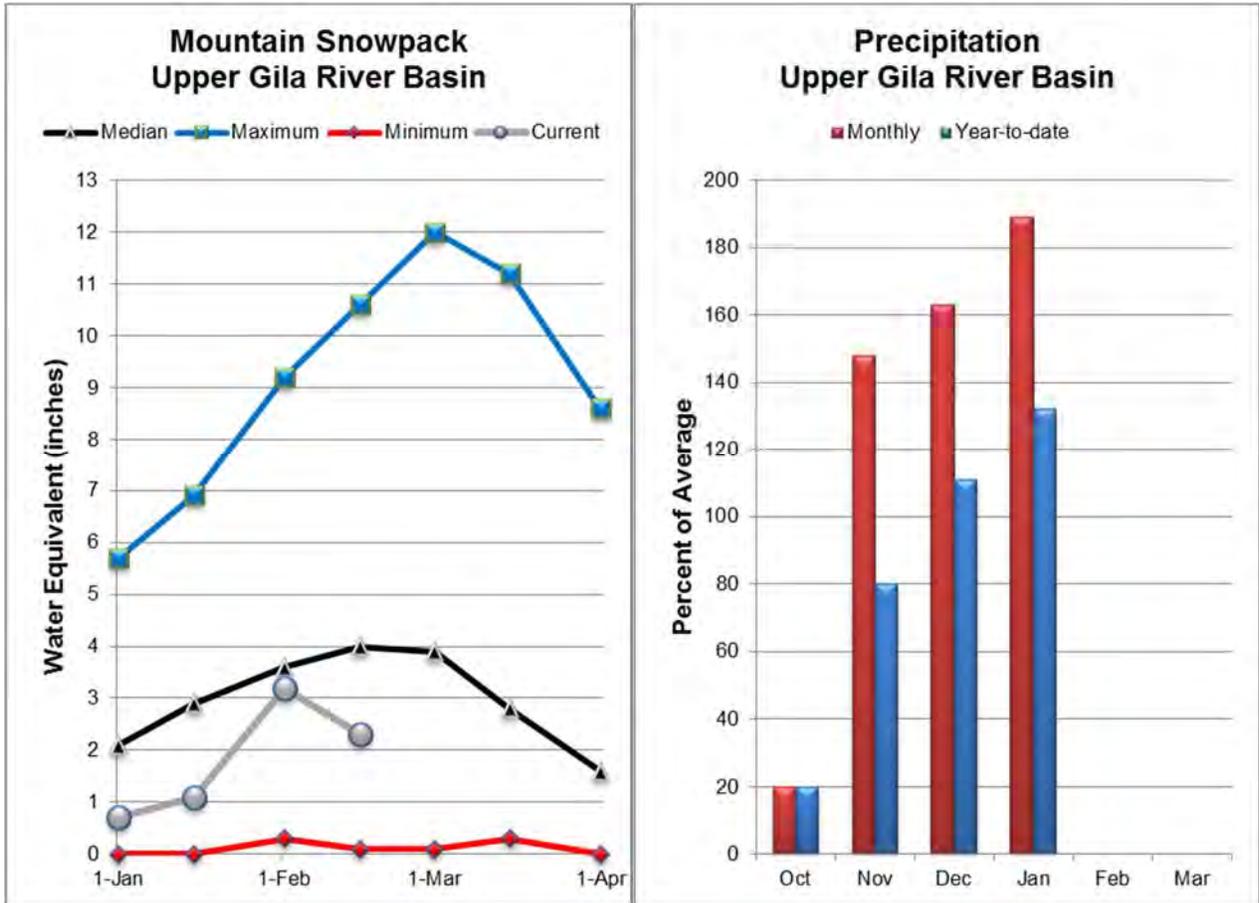
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage Middle of January, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Verde River Reservoir System	270.8	148.4	160.8	287.4
Basin-wide Total	270.8	148.4	160.8	287.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2017	# of Sites	% Median	Last Year % Median
VERDE RIVER BASIN	11	84%	108%

SAN FRANCISCO-UPPER GILA RIVER BASIN as of February 15, 2017

Above normal streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 117% 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 152% of median through May. Snow survey measurements show the snowpack for this basin to be at 58% of median.



San Francisco-Upper Gila River Basin Streamflow Forecasts - February 16, 2017

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	31	44	55	134%	67	88	41
Gila R bl Blue Ck nr Virden ³	F15-MAY	38	60	77	145%	97	130	53
San Francisco R at Glenwood ³	F15-MAY	10.9	18.4	25	149%	33	48	16.8
San Francisco R at Clifton ³	F15-MAY	24	40	54	117%	69	95	46
Gila R nr Solomon ³	FEB			44	191%			23
San Carlos Reservoir Inflow ³	F15-MAY	59	98	129	125%	165	225	103
	F15-MAY	25	64	102	152%	148	230	67

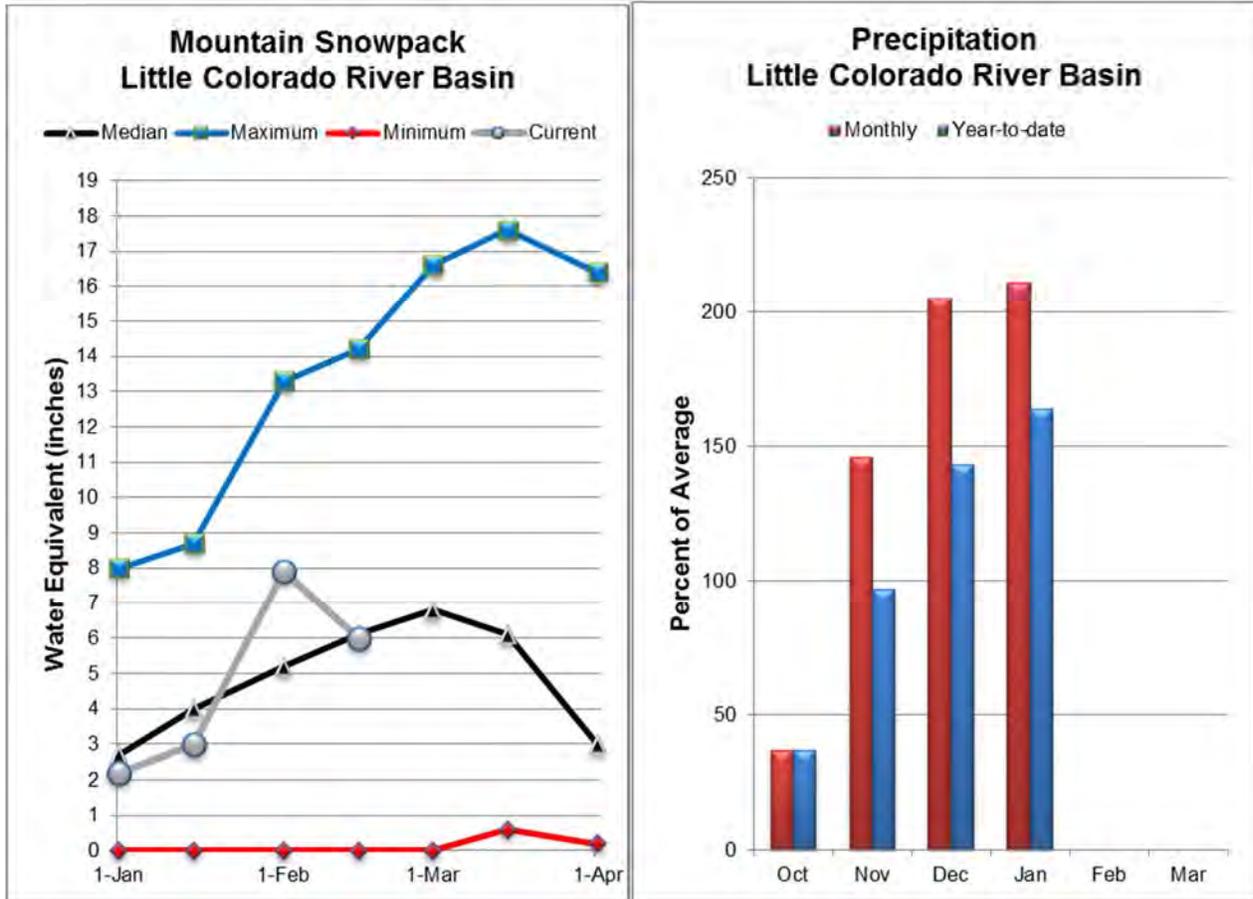
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage Middle of January, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
San Carlos Reservoir	170.8	98.1	385.7	875.0
Basin-wide Total	170.8	98.1	385.7	875.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2017	# of Sites	% Median	Last Year % Median
SAN FRANCISCO-UPPER GILA RIVER BASIN	9	58%	64%

LITTLE COLORADO RIVER BASIN as of February 15, 2017

Well above normal streamflow levels are forecast for the basin. In the Little Colorado River, above Lyman Lake, the forecast calls for 152% of median streamflow through June. At Blue Ridge (C.C. Cragin) Reservoir, inflow to the lake is forecast at 160% of median through May. Snowpacks along the southern headwaters of the Little Colorado River, and along the central Mogollon Rim, were measured at 99% and 95% of median, respectively.



Little Colorado River Basin Streamflow Forecasts - February 16, 2017

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	5.4	7.9	10	152%	12.4	16.6	6.6
Blue Ridge Reservoir Inflow ³	FEB-MAY	11.4	19.1	26	160%	34	50	16.3
Lake Mary Reservoir Inflow ³	FEB-MAY	4.2	6.3	8	186%	10	13.6	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

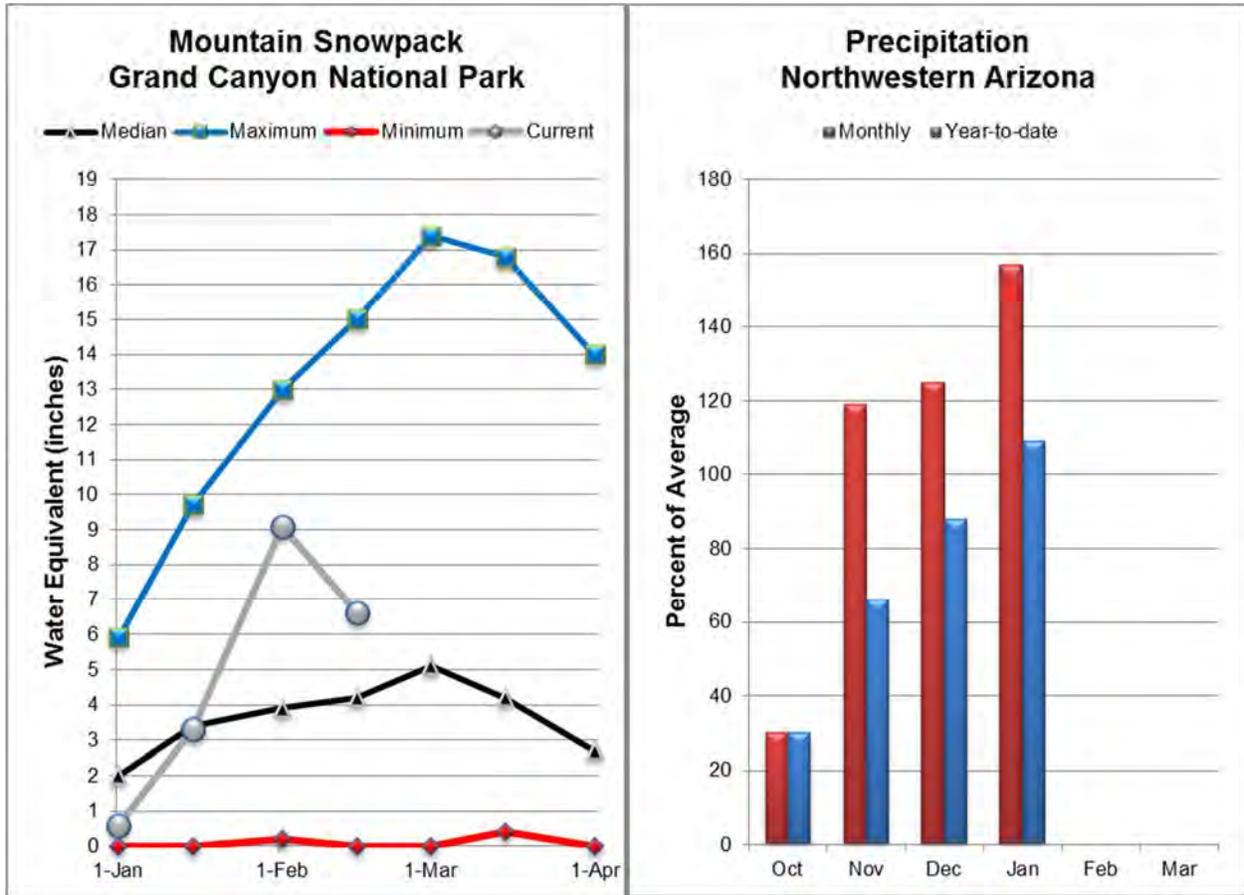
3) Median value used in place of average

Reservoir Storage Middle of January, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lyman Reservoir	8.5	8.7	12.3	30.0
Basin-wide Total	8.5	8.7	12.3	30.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2017	# of Sites	% Median	Last Year % Median
LITTLE COLORADO RIVER BASIN	10	99%	101%
CENTRAL MOGOLLON RIM	4	95%	107%

NORTHWESTERN ARIZONA as of February 15, 2017

On the Colorado River, well above normal inflow to Lake Powell is forecast at 149% of the 30-year average for the forecast period April-July. At the Grand Canyon, measurements conducted by park rangers show the snowpack to be at 157% of median.



Northwestern Arizona Streamflow Forecasts - February 16, 2017

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

NORTHWESTERN ARIZONA	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lake Powell Inflow ²	APR-JUL	7290	9240	10700	149%	12300	14800	7160

- 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, 2017	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Lake Havasu	570.9	558.5	558.7	619.0
Lake Mohave	1692.0	1649.0	1685.0	1810.0
Lake Mead	1087.8	10371.0	20526.0	26159.0
Lake Powell	11229.0	11304.0	17170.0	24322.0
Basin-wide Total	14579.7	23882.5	39939.7	52910.0
# of reservoirs	4	4	4	4

Watershed Snowpack Analysis February 16, 2017	# of Sites	% Median	Last Year % Median
NORTHWESTERN ARIZONA	2	157%	98%

Basinwide Summary: February 16, 2017
(Averages/Medians based on 1981-2010 reference period)

Snowpack Summary for February 16, 2017
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SALT RIVER BASIN	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baldy	SNOTEL	9125	20	6.8	7.5	91%	5.1	68%
Beaver Head	SNOTEL	7990	0	0.0	3.6	0%	1.2	33%
Buck Spring	SC	7400	0	0.0	2.8	0%	2.6	93%
Coronado Trail	SNOTEL	8400	0	0.0	2.9	0%	0.0	0%
Hawley Lake	SNOTEL	8300	31	11.1			12.0	
Coronado Trail	SC	8350	3	0.6	2.2	27%	2.1	95%
Fort Apache	SC	9160	33	9.8	7.1	138%	8.0	113%
Hannagan Meadows	SNOTEL	9020	17	8.0	9.6	83%	5.5	57%
Maverick Fork	SNOTEL	9200	28	10.0	7.9	127%	6.1	77%
Nutrioso	SC	8500	3	0.6	1.0	60%	0.6	60%
Nutrioso	SNOTEL	8500	1	0.2			0.0	
Wildcat	SNOTEL	7850	2	0.6	3.4	18%	2.4	71%
Workman Creek	SNOTEL	6900	4	1.9	5.8	33%	6.6	114%
Basin Index						71%	75%	
# of sites						11	11	
VERDE RIVER BASIN	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	9	2.4	5.2	46%	4.3	83%
Baker Butte No. 2	SC	7700	20	8.4	8.3	101%	9.1	110%
Baker Butte Smt	SNOTEL	7700	26	9.1			9.8	
Bar M	SNOTEL	6393	0	0.0			1.7	
Chalender	SC	7100	0	0.0	2.0	0%	3.0	150%
Chalender	SNOTEL	7100	2	0.6			3.8	
Fort Valley	SC	7350	5	1.6	2.2	73%	1.8	82%
Fort Valley	SNOTEL	7350	0	0.0			0.0	
Fry	SNOTEL	7200	17	7.1	6.3	113%	7.7	122%
Happy Jack	SNOTEL	7630	16	6.3	5.3	119%	6.4	121%
Happy Jack	SC	7630	7	2.7	4.8	56%	3.8	79%
Mormon Mountain	SNOTEL	7500	16	6.1	4.3	142%	4.9	114%
Mormon Mountain Summit #2	SC	8470	33	13.4	7.8	172%		
Mormon Mtn Summit	SNOTEL	8500	26	11.3			8.3	
Newman Park	SC	6750	0	0.0	2.6	0%	5.1	196%
White Horse Lake	SNOTEL	7180	4	2.5	4.5	56%	2.8	62%
Williams Ski Run	SC	7720	21	7.3	7.5	97%	8.6	115%
Basin Index						84%	108%	
# of sites						11	11	
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	77	24.2	14.9	162%	14.2	95%
Snowslide Canyon	SNOTEL	9730	78	27.0	12.5	216%	7.8	62%
Basin Index						187%	80%	
# of sites						2	2	
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	0	0.0	3.6	0%	1.2	33%
Coronado Trail	SNOTEL	8400	0	0.0	2.9	0%	0.0	0%
Coronado Trail	SC	8350	3	0.6	2.2	27%	2.1	95%
Frisco Divide	SNOTEL	8000	4	1.6	2.9	55%	2.3	79%
Hannagan Meadows	SNOTEL	9020	17	8.0	9.6	83%	5.5	57%
Hummingbird - Aerial And Snow Course	SC	10550						
Lookout Mountain	SNOTEL	8500	6	1.2	2.5	48%	0.5	20%

Nutrioso	SC	8500	3	0.6	1.0	60%	0.6	60%
Nutrioso	SNOTEL	8500	1	0.2			0.0	
Signal Peak	SNOTEL	8360	4	1.1	4.1	27%	3.5	85%
Silver Creek Divide	SNOTEL	9000	24	7.9	7.4	107%	7.3	99%
State Line	SC	8000			2.0			
Whitewater - Aerial And Snow Course	SC	10750						

Basin Index **58%**
64%
of sites 9 9

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	9	2.4	5.2	46%	4.3	83%
Baker Butte No. 2	SC	7700	20	8.4	8.3	101%	9.1	110%
Baker Butte Smt	SNOTEL	7700	26	9.1			9.8	
Baldy	SNOTEL	9125	20	6.8	7.5	91%	5.1	68%
Buck Spring	SC	7400	0	0.0	2.8	0%	2.6	93%
Cheese Springs	SC	8700	19	5.8	5.0	116%	5.6	112%
Fort Apache	SC	9160	33	9.8	7.1	138%	8.0	113%
Heber	SNOTEL	7640	12	5.1	5.1	100%	4.4	86%
Lake Mary	SC	6930	4	1.1	2.6	42%	4.3	165%
Maverick Fork	SNOTEL	9200	28	10.0	7.9	127%	6.1	77%
Promontory	SNOTEL	7930	26	10.7	9.5	113%	12.2	128%

Basin Index **99%**
101%
of sites 10 10

CENTRAL MOGOLLON RIM	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Baker Butte	SNOTEL	7300	9	2.4	5.2	46%	4.3	83%
Baker Butte No. 2	SC	7700	20	8.4	8.3	101%	9.1	110%
Baker Butte Smt	SNOTEL	7700	26	9.1			9.8	
Heber	SNOTEL	7640	12	5.1	5.1	100%	4.4	86%
Promontory	SNOTEL	7930	26	10.7	9.5	113%	12.2	128%

Basin Index **95%**
107%
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			8.5			
Beaver Spring	SNOTEL	9200	29	10.9			9.2	
Bowl Canyon	SC	8980			7.2		8.6	119%
Hidden Valley	SC	8480					7.2	
Missionary Spring	SC	7940			4.0		3.0	75%
Tsaile Canyon #1	SC	8160			6.0		7.7	128%
Tsaile Canyon #3	SC	8920			9.0		9.8	109%
Whiskey Creek	SC	9050			8.0		10.1	126%
Navajo Whiskey Ck	SNOTEL	9050	29	11.0			8.6	

Basin Index 0
0
of sites 0 0

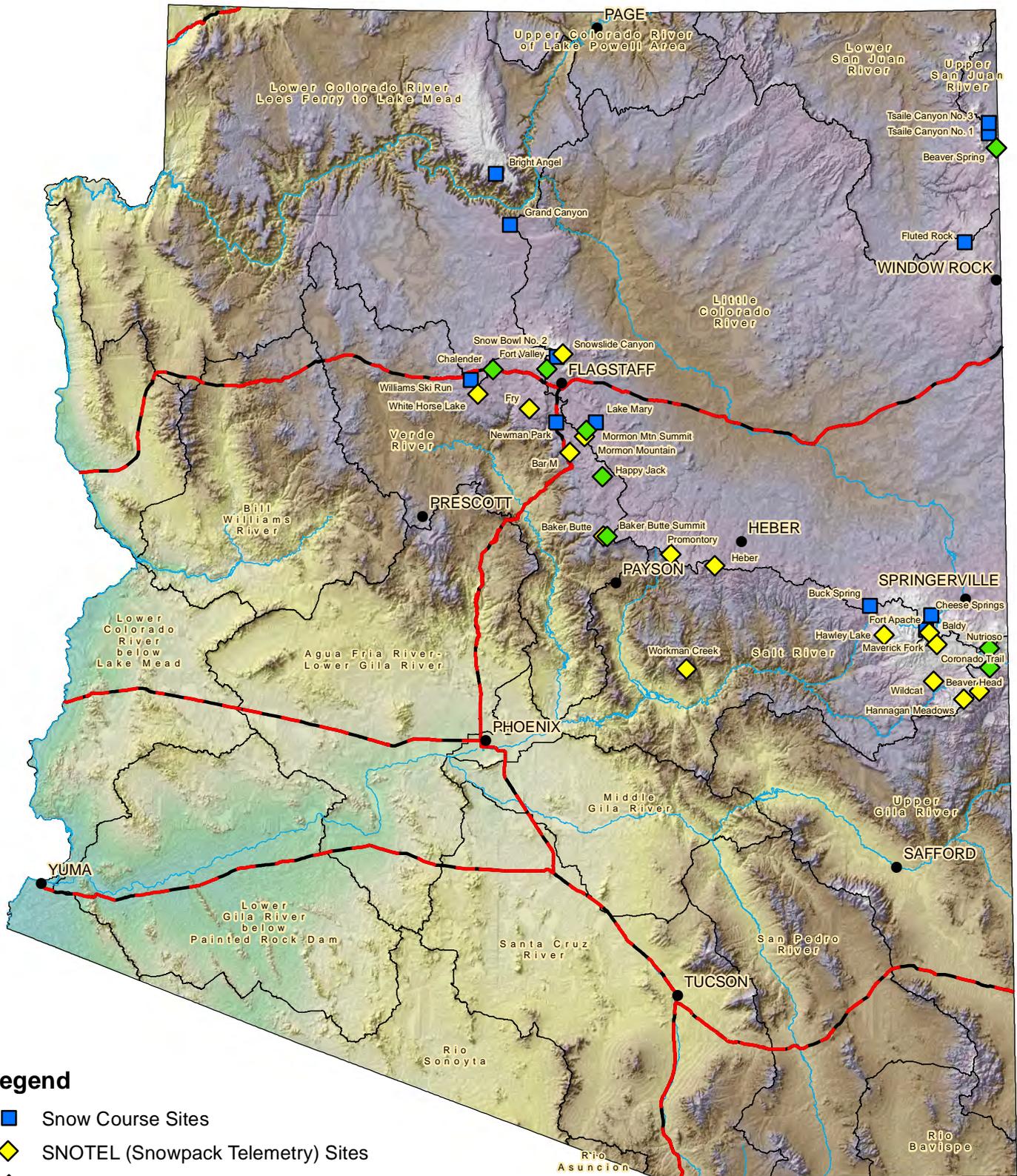
DEFIANCE PLATEAU	Network	Elevation (ft)	Depth (in)	SWE (in)	Median (in)	% Median	Last Year SWE (in)	Last Year % Median
Fluted Rock	SC	7800			3.7		4.2	114%

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	29	12.1	6.6	183%	6.7	102%
Grand Canyon	SC	7500	2	0.9	1.7	53%	1.4	82%

Basin Index **157%**
98%
of sites 2 2

Arizona Snow Survey Data Sites



Legend

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

