



United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

# Arizona Basin Outlook Report January 15, 2014



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

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### ***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 January 15, 2014

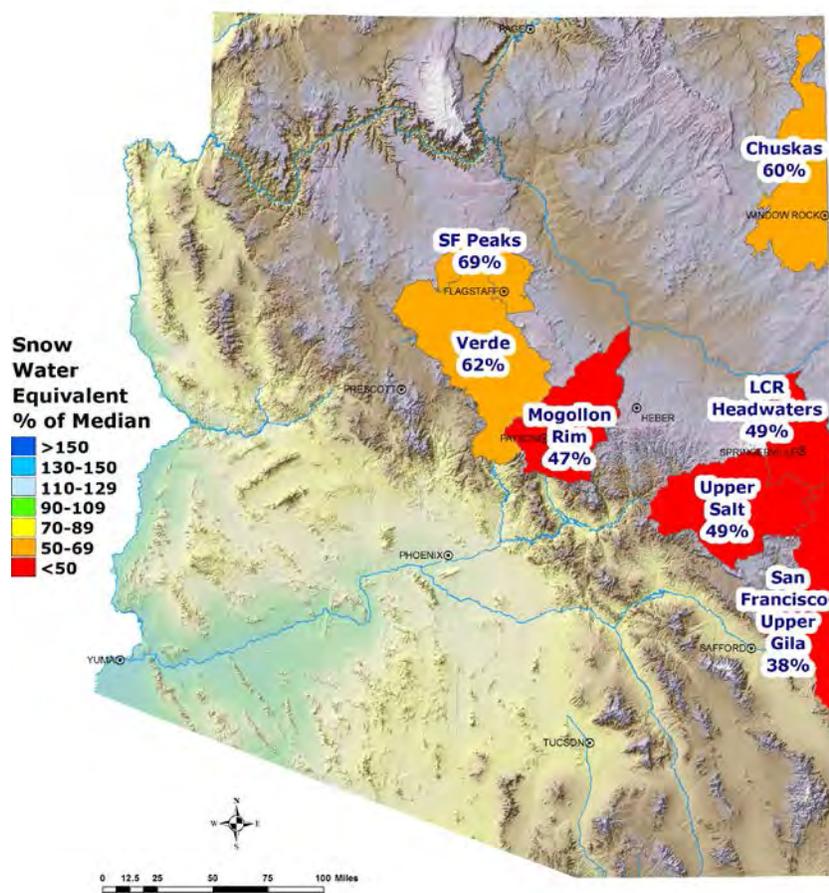
## SUMMARY

As of January 15, snowpack levels are now well below normal throughout the state. Precipitation for the first half of January was well below average in the major river basins. The Salt and Verde River reservoir system stands at 55 percent of capacity, while San Carlos Reservoir is at 15 percent of capacity. The mid-month forecast calls for well below normal runoff in all basins for the spring runoff period.

## SNOWPACK

Snow water equivalent levels in the state's major river basins are well below normal, ranging from 38 percent of median in the San Francisco-Upper Gila River Basin to 62 percent of median in the Verde River Basin. The statewide snowpack is also well below normal at 54 percent of median.

**Arizona  
Snow Water Equivalent  
as of January 15, 2014**

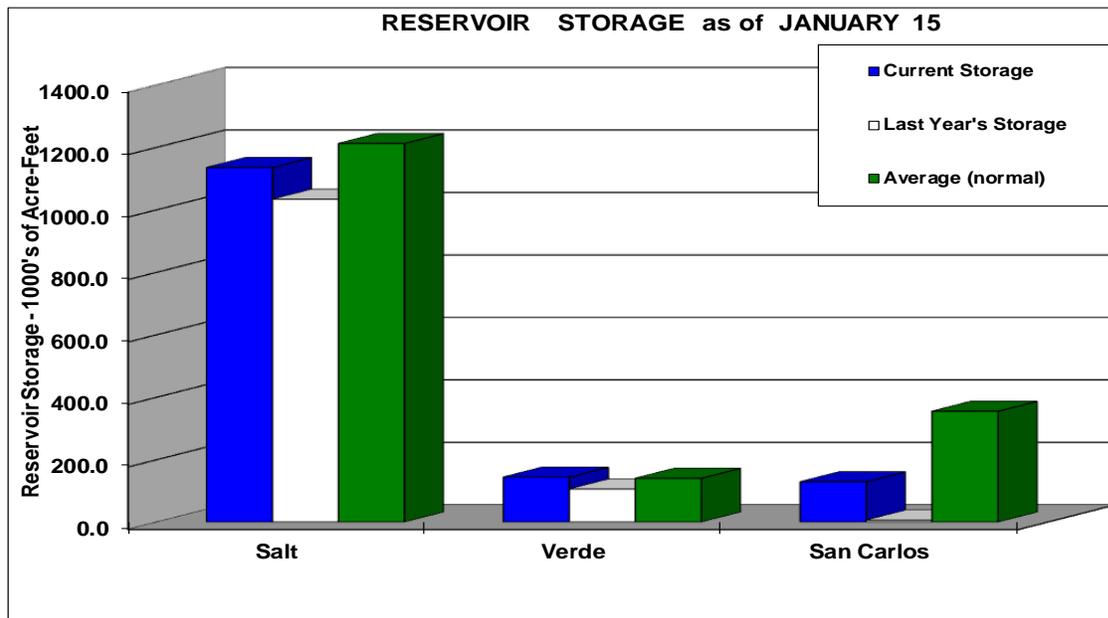


## PRECIPITATION

Mountain data from NRCS SNOTEL sites and NWS Cooperator gages show that precipitation for the first half of January was well below normal throughout the basins. In fact, there was no measureable rainfall at any of the sites monitored for this report. Cumulative precipitation since October 1 is now well below normal in all 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 55 percent of capacity. San Carlos Reservoir is currently at 15 percent of capacity.



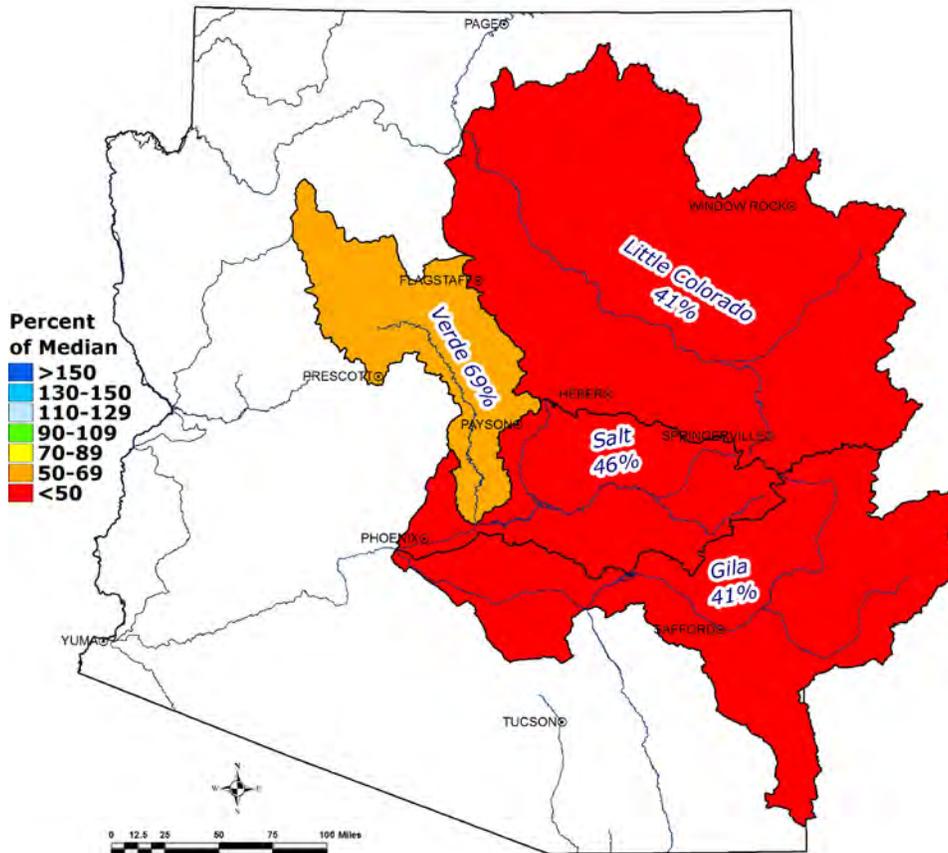
Key storage volumes displayed in thousands of acre-feet (x1000):

<u>Reservoir</u>	<u>Current Storage</u>	<u>Last Year Storage</u>	<u>30-Year Average</u>	<u>Storage Capacity</u>
Salt River System	1135.1	1033.7	1212.0	2025.8
Verde River System	144.0	105.7	140.2	287.4
San Carlos Reservoir	129.1	6.1	355.0	875.0
Lyman Lake	9.0	4.3	12.0	30.0
Lake Havasu	538.1	555.6	561.2	619.0
Lake Mohave	1649.5	1591.6	1659.0	1810.0
Lake Mead	12427.0	13741.0	20361.0	26159.0
Lake Powell	10078.0	12425.0	17553.0	24322.0

# STREAMFLOW

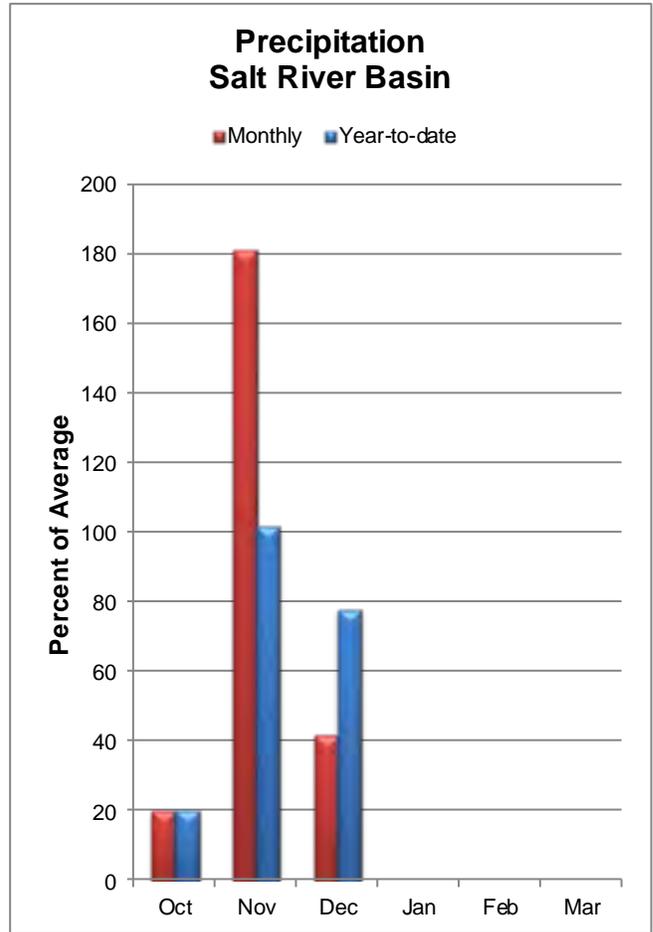
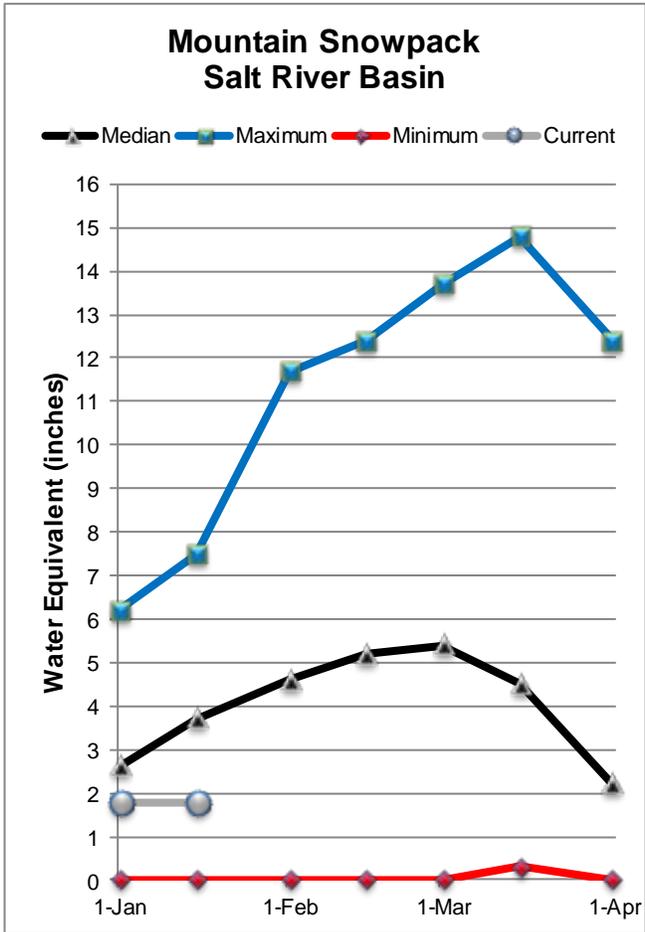
As of January 15, the forecast calls for well below normal streamflow for the spring runoff period, ranging from 41 percent of median in the Gila River near Solomon to 69 percent of median in the Verde River above Horseshoe Dam. The mid-month streamflow forecasts are down-graded from the last report, due to the lack of precipitation during the first half of the month, and predictions for dry conditions to persist. Please refer to the basin forecast tables found in this report for more information regarding water supply forecasts.

## Arizona Spring Streamflow Forecasts as of January 15, 2014



## SALT RIVER BASIN as of January 15, 2014

Well below normal streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 46% of median streamflow through May, while at Tonto Creek, the forecast calls for 47% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 49% of median.



### Salt River Basin Streamflow Forecasts - January 15, 2014

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 <sup>3</sup>	JAN15-MAY	45	93	139	46%	198	315	300
	JAN			12	50%			
	MAR-MAY	34	70	104	43%	148	235	240
Tonto Ck ab Gun Ck nr Roosevelt <sup>3</sup>	JAN15-MAY	3.4	10.2	18	47%	29	52	38

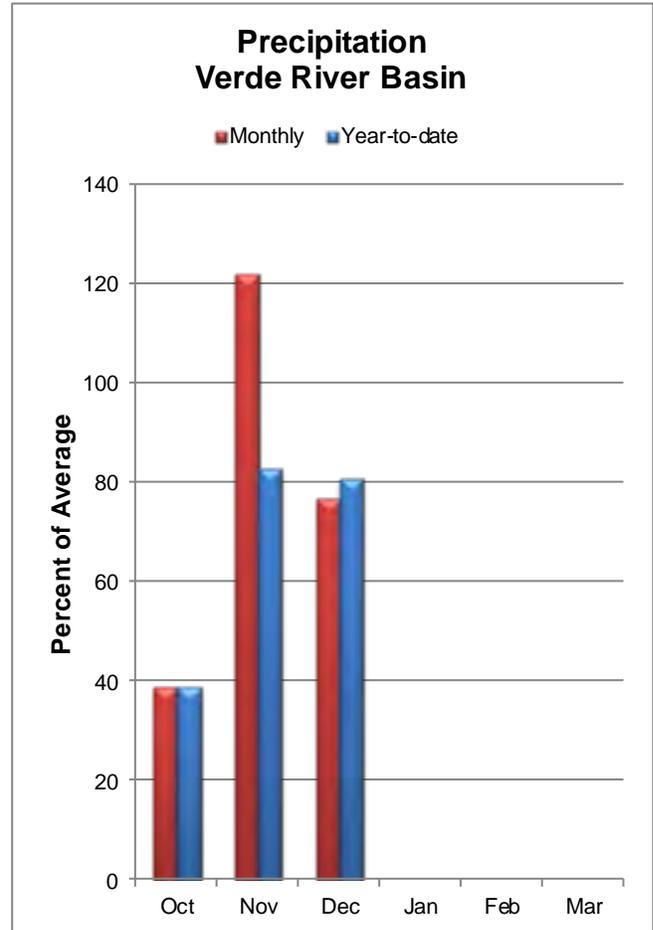
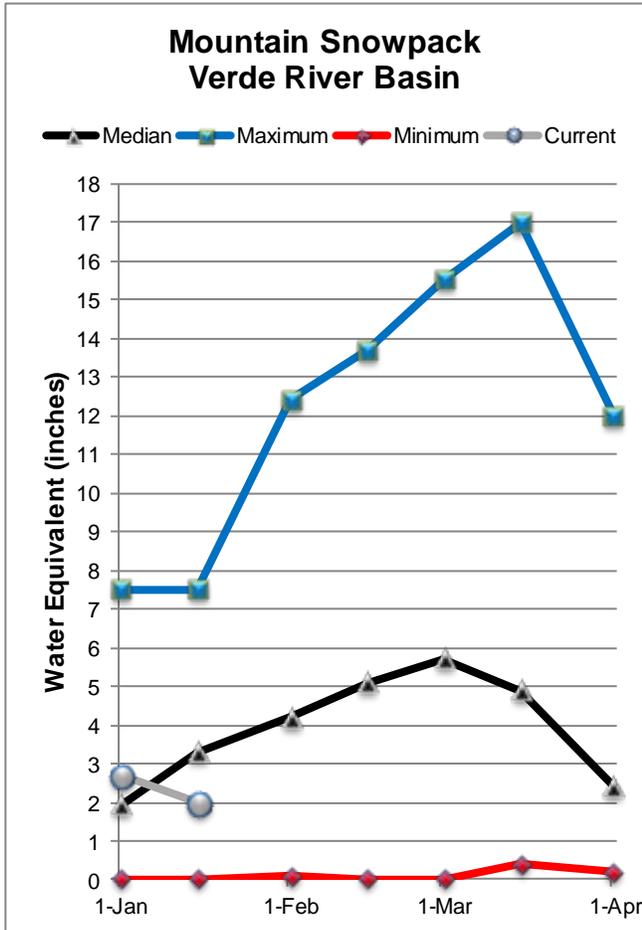
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage Mid-January, 2014	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
SALT RIVER RESERVOIR SYSTEM	1135.1	1033.7	1212.0	2025.8
Basin-wide Total	1135.1	1033.7	1212.0	2025.8
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 15, 2014	# of Sites	% Median	Last Year % Median
SALT RIVER BASIN	10	49%	104%

## VERDE RIVER BASIN as of January 15, 2014

Well below normal streamflow levels are forecast for the basin. In the Verde River, at Horseshoe Dam, the forecast calls for 69% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 62% of median.



## Verde River Basin Streamflow Forecasts - January 15, 2014

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 <sup>3</sup>	JAN15-MAY	31	65	100	69%	145	235	145
	JAN			15	65%			23

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

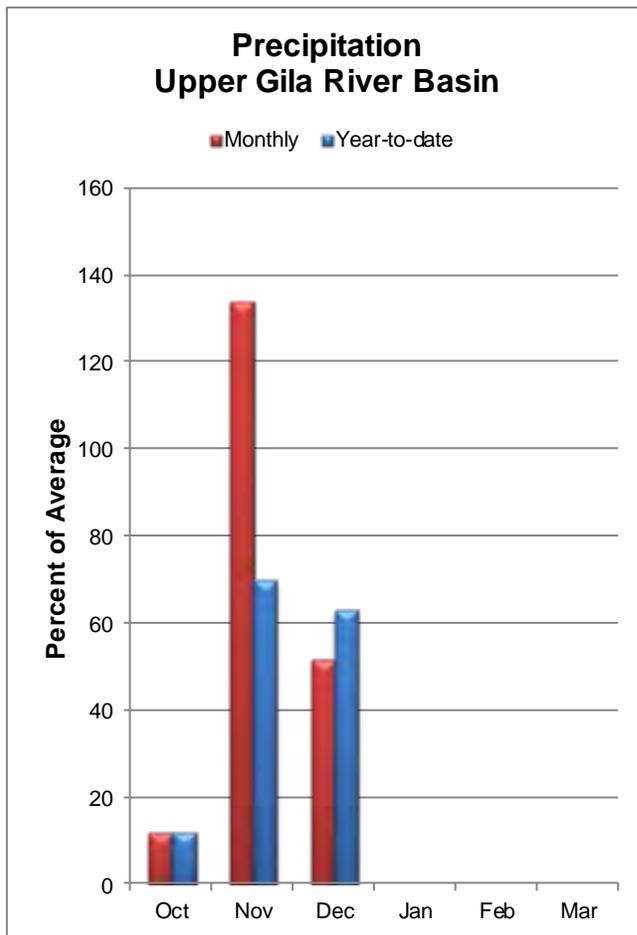
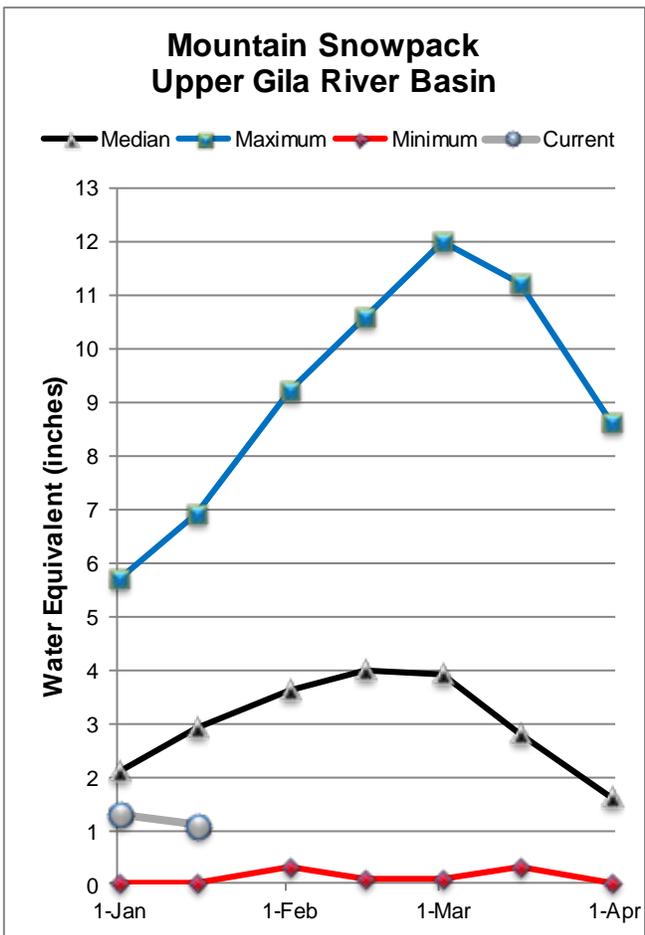
3) Median value used in place of average

<b>Reservoir Storage Mid-January, 2014</b>	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
VERDE RIVER RESERVOIR SYSTEM	144.0	105.7	140.2	287.4
Basin-wide Total	144.0	105.7	140.2	287.4
# of reservoirs	1	1	1	1

<b>Watershed Snowpack Analysis January 15, 2014</b>	# of Sites	% Median	Last Year % Median
VERDE RIVER BASIN	11	62%	126%

## SAN FRANCISCO-UPPER GILA RIVER BASIN as of January 15, 2014

Well below normal streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 54% of median streamflow levels through May. In the Gila River, near Solomon, the forecast calls for 41% of median streamflow levels through May. At San Carlos Reservoir, inflow to the lake is forecast at 29% of median through May. Snow survey measurements show the snowpack for this basin to be at 38% of median.



### San Francisco-Upper Gila River Basin Streamflow Forecasts - January 15, 2014

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 <sup>3</sup>	JAN15-MAY	6.2	13.6	21	39%	31	50	54
Gila R bl Blue Ck nr Virden <sup>3</sup>	JAN15-MAY	1	10.9	24	33%	41	76	72
San Francisco R at Glenwood <sup>3</sup>	JAN15-MAY	2.6	7.1	12	61%	18.8	33	19.6
San Francisco R at Clifton <sup>3</sup>	JAN15-MAY	2.8	15.5	30	54%	49	85	56
Gila R nr Solomon <sup>3</sup>	JAN15-MAY	4.7	27	53	41%	88	155	130
San Carlos Reservoir Inflow <sup>3</sup>	JAN	4.8	9.7	14	71%	19.1	28	19.7
	JAN15-MAY	0	6.4	26	29%	58	129	90

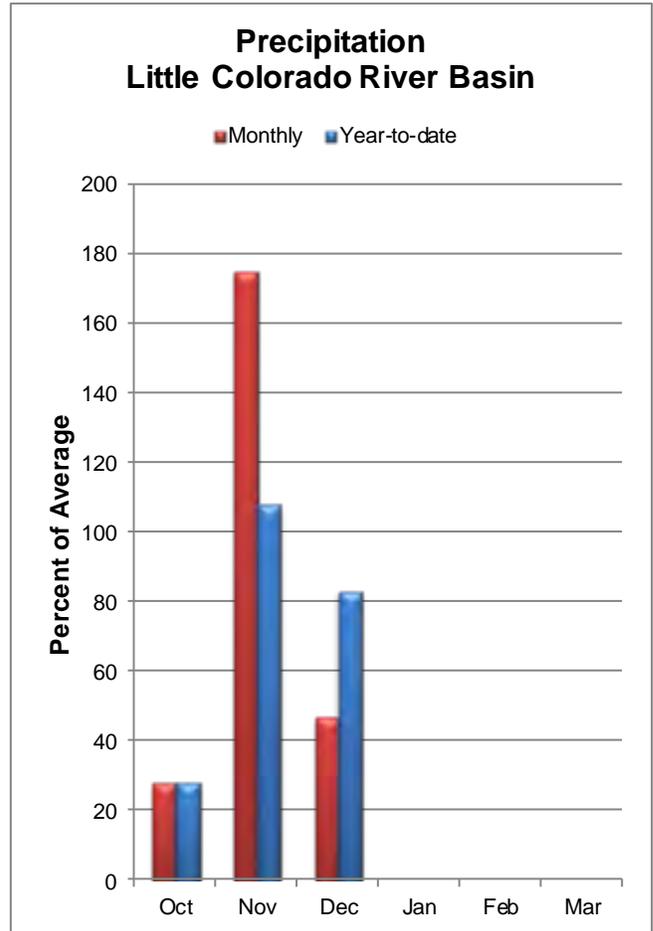
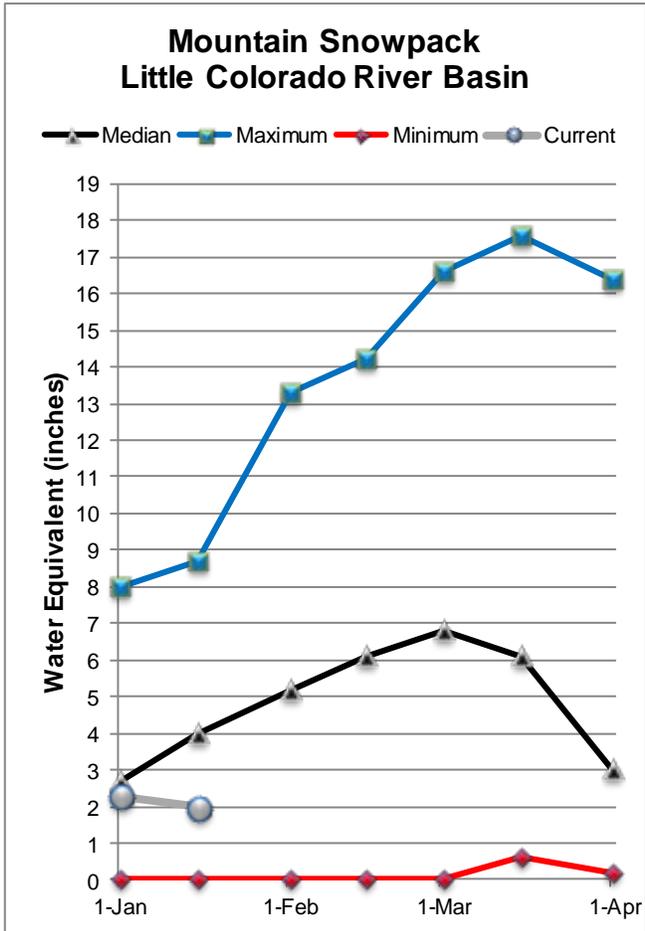
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage Mid-January, 2014	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
SAN CARLOS RESERVOIR AT COOLIDGE DAM	129.1	6.1	355.0	875.0
Basin-wide Total	129.1	6.1	355.0	875.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis January 15, 2014	# of Sites	% Median	Last Year % Median
SAN FRANCISCO-UPPER GILA RIVER BASIN	9	38%	84%

## LITTLE COLORADO RIVER BASIN as of January 15, 2014

Well below normal streamflow levels are forecast for the basin. In the Little Colorado River, above Lyman Lake, the forecast calls for 41% of median streamflow through June. At Blue Ridge (C.C. Cragin) Reservoir, inflow to the lake is forecast at 38% of median through May. Snowpacks along the southern headwaters of the Little Colorado River, and along the central Mogollon Rim, were measured at 49% and 47% of median, respectively.



### Little Colorado River Basin Streamflow Forecasts - January 15, 2014

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 <sup>3</sup>	JAN15-JUN	0.82	1.83	2.9	41%	4.2	6.9	7.1
Blue Ridge Reservoir Inflow <sup>3</sup>	JAN15-MAY	1.13	3.5	6.3	38%	10.2	18.5	16.6
Lake Mary Reservoir Inflow <sup>3</sup>	JAN15-MAY	0.57	1.28	2	42%	2.9	4.8	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

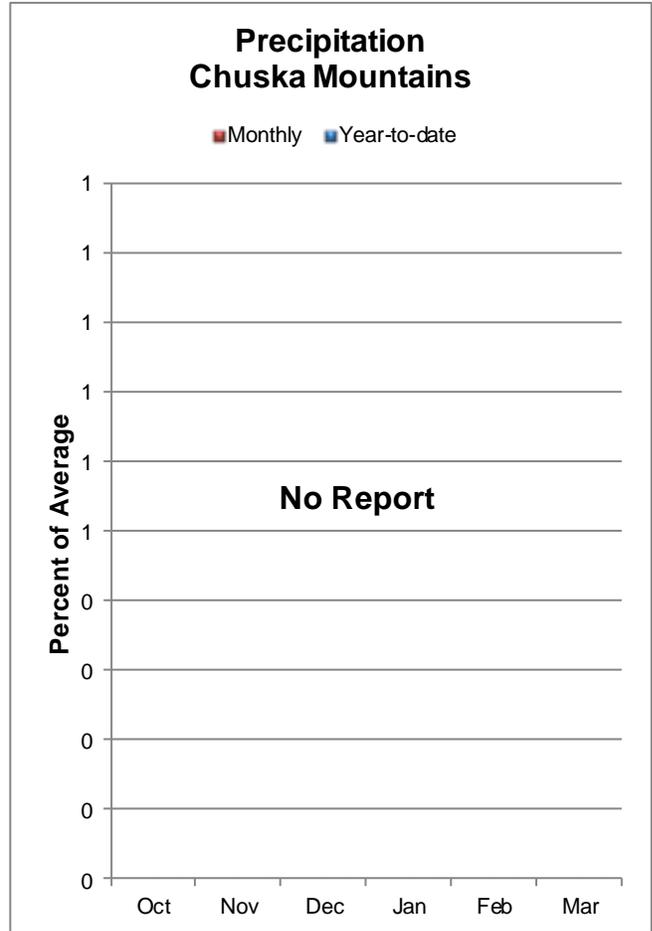
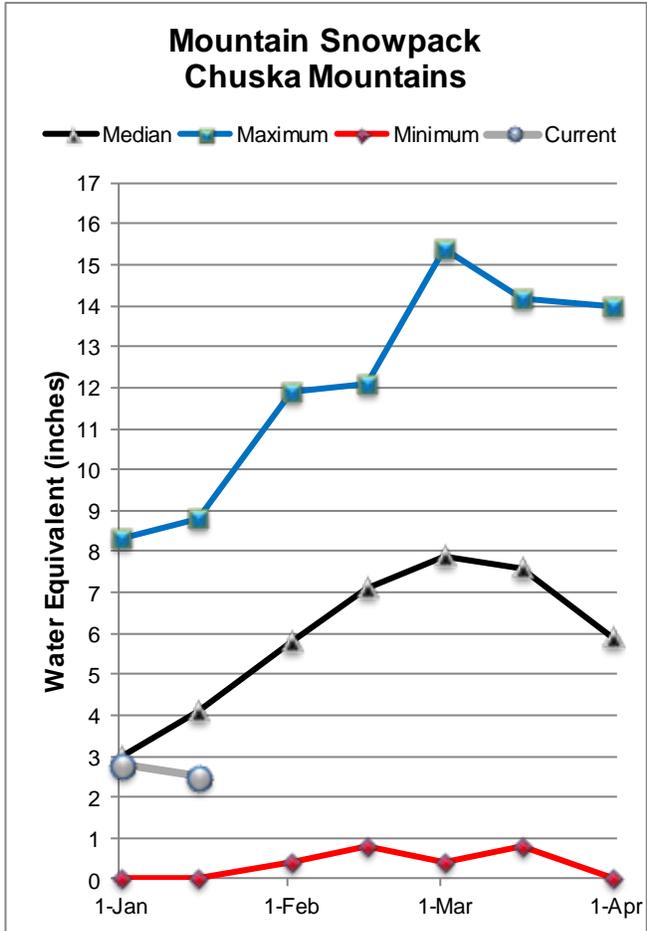
3) Median value used in place of average

<b>Reservoir Storage Mid-January, 2014</b>	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
LYMAN RESERVOIR	9.0	4.3	12.0	30.0
Basin-wide Total	9.0	4.3	12.0	30.0
# of reservoirs	1	1	1	1

<b>Watershed Snowpack Analysis January 15, 2014</b>	# of Sites	% Median	Last Year % Median
LITTLE COLORADO RIVER BASIN	10	49%	101%
CENTRAL MOGOLLON RIM	4	47%	118%

## CHUSKA MOUNTAINS as of January 15, 2014

Snow survey measurements conducted by staff of the Navajo Nation Water Management Branch show the Chuska snowpack to be at 60% of median. The forecast calls for well below normal runoff for Wheatfields Creek, Captain Tom Wash, Bowl Canyon Creek, and Kinlichee Creek.



## Chuska Mountains Streamflow Forecasts - January 15, 2014

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

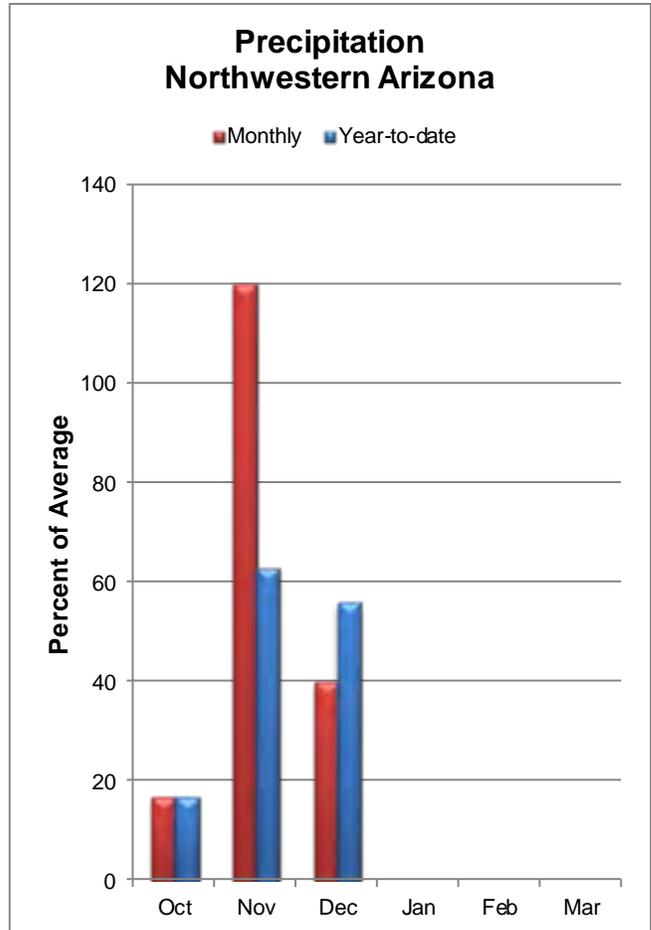
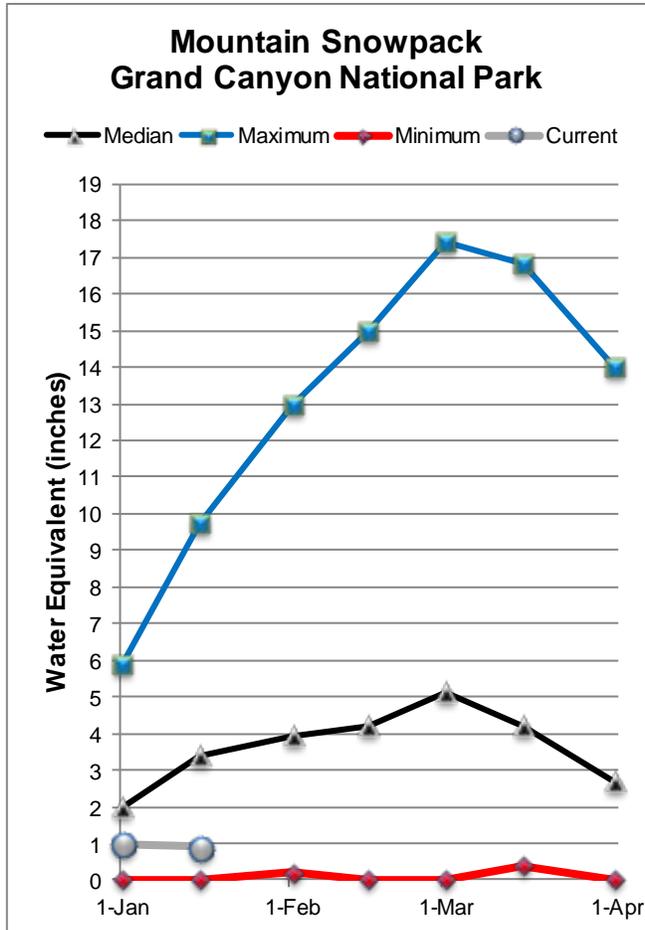
<b>CHUSKA MOUNTAINS</b>	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Captain Tom Wash nr Two Gray Hills	MAR-MAY	0	0.2	0.79	30%	1.99	5.4	2.6
Wheatfields Ck nr Wheatfields	MAR-MAY	0.13	0.53	0.96	46%	1.5	2.5	2.1
Bowl Canyon Ck ab Asaayi Lake	MAR-MAY	0.07	0.36	0.69	53%	1.14	1.99	1.3
Kinlichee Ck	MAR-MAY	0	0.07	0.41	27%	1.22	3.7	1.52

- 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

<b>Watershed Snowpack Analysis January 15, 2014</b>	# of Sites	% Median	Last Year % Median
CHUSKA MOUNTAINS	3	60%	104%
DEFIANCE PLATEAU	2	42%	104%

## NORTHWESTERN ARIZONA as of January 15, 2014

On the Colorado River, below normal inflow to Lake Powell is forecast at 88% 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 27% of median.



## Northwestern Arizona Streamflow Forecasts - January 15, 2014

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 <sup>2</sup>	APR-JUL	3270	4960	6300	88%	7810	10300	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 Mid-January, 2014	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
LAKE HAVASU NEAR PARKER DAM, AZ-CA	538.1	555.6	561.2	619.0
LAKE MOHAVE AT DAVIS DAM, AZ-NV	1649.5	1591.6	1659.0	1810.0
LAKE MEAD AT HOOVER DAM, AZ-NV	12427.0	13741.0	20361.0	26159.0
LAKE POWELL AT GLEN CANYON DAM	10078.0	12425.0	17553.0	24322.0
Basin-wide Total	24692.6	28313.2	40134.2	52910.0
# of reservoirs	4	4	4	4

Watershed Snowpack Analysis January 15, 2014	# of Sites	% Median	Last Year % Median
NORTHWESTERN ARIZONA	1	27%	101%

**Basinwide Summary: January 15, 2014**  
**(Averages/Medians based on 1981-2010 reference period)**

Snowpack Summary for January 15, 2014
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<b>SALT RIVER BASIN</b>	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
5. BALDY	SNOTEL	9125'	8	2.6	5	52%
8. BEAVER HEAD	SNOTEL	7990'	3	2.4	3.2	75%
12. BUCK SPRING	SC	7400'	1	0.3	2.3	13%
16. CORONADO TRAIL	SNOTEL	8400'	0	0.1	2.8	4%
19. FORT APACHE	SC	9160'	13	2.5	5.2	48%
24. HANNAGAN MEADOWS	SNOTEL	9020'	15	3.6	6.1	59%
29. MAVERICK FORK	SNOTEL	9200'	8	2.9	5.2	56%
34. NUTRIOSO	SC	8500'	0	0	1.3	0%
35. NUTRIOSO	SNOTEL	8500'	0	0.1		
42. WILDCAT	SNOTEL	7850'	0	0.3	2.4	13%
44. WORKMAN CREEK	SNOTEL	6900'	12	3.4	3.1	110%

**Basin Index** **49%**  
# of sites 10

<b>VERDE RIVER BASIN</b>	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
2. BAKER BUTTE	SNOTEL	7300'	7	1.9	2.9	66%
3. BAKER BUTTE NO. 2	SC	7700'	14	2.6	5.6	46%
4. BAKER BUTTE SMT	SNOTEL	7700'	17	4.7		
6. BAR M	SNOTEL	6393'	2	1		
13. CHALENDER	SC	7100'	5	1.5		
14. CHALENDER	SNOTEL	7100'	2	0.4	1.6	25%
20. FORT VALLEY	SC	7350'	2	0.5	1.8	28%
21. FORT VALLEY	SNOTEL	7350'	1	0.2		
22. FRY	SNOTEL	7200'	16	3.3	4	83%
25. HAPPY JACK	SNOTEL	7630'	12	3.4	3	113%
30. MORMON MOUNTAIN	SNOTEL	7500'	4	1.9	2.8	68%
31. MORMON MOUNTAIN SUMMIT #2	SC	8470'			5.4	
32. MORMON MTN SUMMIT	SNOTEL	8500'	13	3.4		
33. NEWMAN PARK	SC	6750'	3	0.9	1.4	64%
41. WHITE HORSE LAKE	SNOTEL	7180'	1	1.2	3	40%
43. WILLIAMS SKI RUN	SC	7720'	12	3.2	4.8	67%

**Basin Index** **62%**  
# of sites 10

<b>SAN FRANCISCO PEAKS</b>	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
37. SNOW BOWL #2	SC	11200'	19	5.5	10.8	51%
38. SNOWSLIDE CANYON	SNOTEL	9730'	31	8.6	9.7	89%

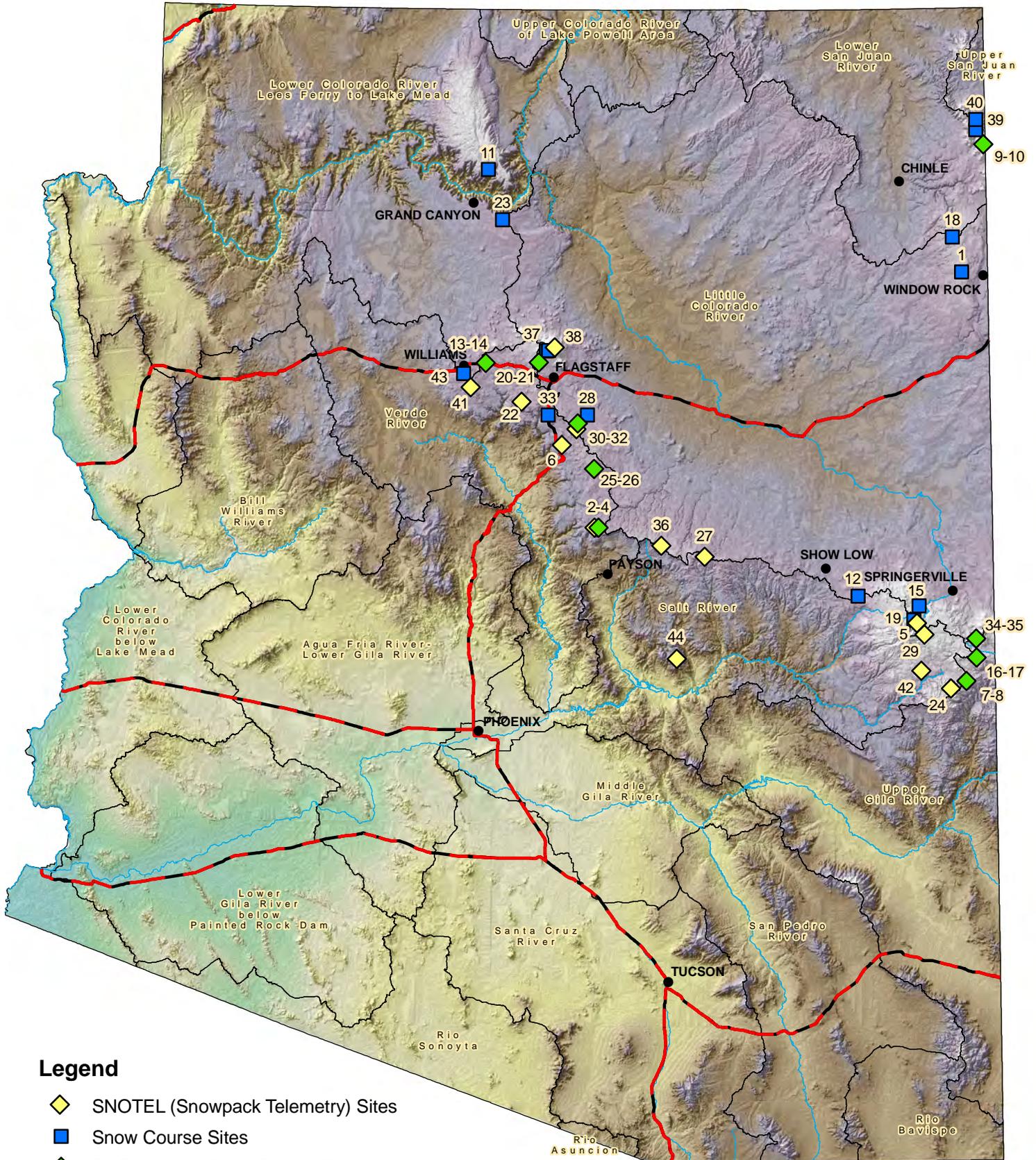
**Basin Index** **69%**  
# of sites 2

<b>SAN FRANCISCO-UPPER GILA RIVER BASIN</b>	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
8. BEAVER HEAD	SNOTEL	7990'	3	2.4	3.2	75%
16. CORONADO TRAIL	SNOTEL	8400'		0.1	2.8	4%
FRISCO DIVIDE	SNOTEL	8000'	7	2	2	100%
24. HANNAGAN MEADOWS	SNOTEL	9020'	15	3.6	6.1	59%
HUMMINGBIRD - AERIAL AND SNOW COURSE	SC	10550'				
LOOKOUT MOUNTAIN	SNOTEL	8500'	1	0.6	1.8	33%
34. NUTRIOSO	SC	8500'	0	0	1.3	0%
35. NUTRIOSO	SNOTEL	8500'	0	0.1		
SIGNAL PEAK	SNOTEL	8360'	2	0.7	3.1	23%
SILVER CREEK DIVIDE	SNOTEL	9000'	9	1.7	4.4	39%
STATE LINE	SC	8000'			1.4	
WHITewater - AERIAL AND SNOW COURSE	SC	10750'				

**Basin Index** **38%**  
# of sites 8

<b>LITTLE COLORADO RIVER BASIN</b>		Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
2. BAKER BUTTE	SNOTEL	7300'	7	1.9	2.9	66%	
3. BAKER BUTTE NO. 2	SC	7700'	14	2.6	5.6	46%	
4. BAKER BUTTE SMT	SNOTEL	7700'	17	4.7			
6. BALDY	SNOTEL	9125'	8	2.6	5	52%	
12. BUCK SPRING	SC	7400'	1	0.3	2.3	13%	
15. CHEESE SPRINGS	SC	8700'	8	1.2	3.4	35%	
19. FORT APACHE	SC	9160'	13	2.5	5.2	48%	
27. HEBER	SNOTEL	7640'	4	1.1	3.1	35%	
28. LAKE MARY	SC	6930'	9	2.4	2.2	109%	
29. MAVERICK FORK	SNOTEL	9200'	8	2.9	5.2	56%	
36. PROMONTORY	SNOTEL	7930'	8	2.4	5.4	44%	
<b>Basin Index</b>						<b>49%</b>	
# of sites							10
<b>CENTRAL MOGOLLON RIM</b>		Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
2. BAKER BUTTE	SNOTEL	7300'	7	1.9	2.9	66%	
3. BAKER BUTTE NO. 2	SC	7700'	14	2.6	5.6	46%	
4. BAKER BUTTE SMT	SNOTEL	7700'	17	4.7			
27. HEBER	SNOTEL	7640'	4	1.1	3.1	35%	
36. PROMONTORY	SNOTEL	7930'	8	2.4	5.4	44%	
<b>Basin Index</b>						<b>47%</b>	
# of sites							4
<b>CHUSKA MOUNTAINS</b>		Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
9. BEAVER SPRING	SC	9220'	9	3.2			
10. BEAVER SPRING	SNOTEL	9200'	10	2.5	5	50%	
BOWL CANYON	SC	8980'			4		
HIDDEN VALLEY	SC	8480'					
MISSIONARY SPRING	SC	7940'			2.5		
39. TSAILE CANYON #1	SC	8160'	11	2.4	3.2	75%	
40. TSAILE CANYON #3	SC	8920'	13	3.2	5.4	59%	
WHISKEY CREEK	SC	9050'			4.4		
NAVAJO WHISKEY CK	SNOTEL	9050'	5	2.3			
<b>Basin Index</b>						<b>60%</b>	
# of sites							3
<b>DEFIANCE PLATEAU</b>		Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
1. ARBABS FOREST	SC	7680'	2	0.4	1.6	25%	
18. FLUTED ROCK	SC	7800'	5	1.1	2	55%	
<b>Basin Index</b>						<b>42%</b>	
# of sites							2
<b>NORTHWESTERN ARIZONA</b>		Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
11. BRIGHT ANGEL	SC	8400'	5	1.4	5.1	27%	
23. GRAND CANYON	SC	7500'			1.7		
<b>Basin Index</b>						<b>27%</b>	
# of sites							1

# Arizona Snow Survey Data Sites



## Legend

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

