



Natural
Resources
Conservation
Service

Arizona

Basin Outlook Report

February 15, 2014



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.



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ARIZONA Basin Outlook Report as of February 15, 2014

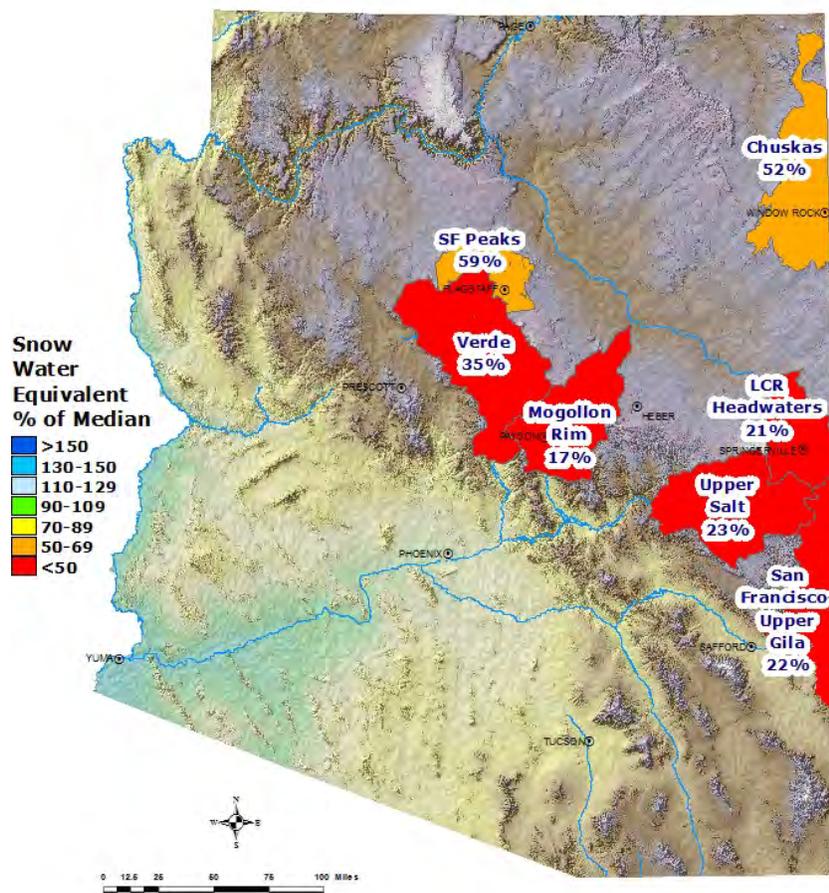
SUMMARY

As of February 15, snowpack levels are well below normal in the major basins. Precipitation for the first half of February was well below normal throughout the basins. The Salt and Verde River reservoir system stands at 56 percent of capacity, while San Carlos Reservoir is at 14 percent of capacity. The mid-month forecast calls for well below normal runoff in all major basins for the spring runoff period.

SNOWPACK

Snow water equivalent levels are well below normal in the major basins, ranging from a low of 21 percent of median in the Little Colorado River Basin to a high of 35 percent of median in the Verde River Basin. The statewide snowpack is well below normal at 33 percent of median.

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

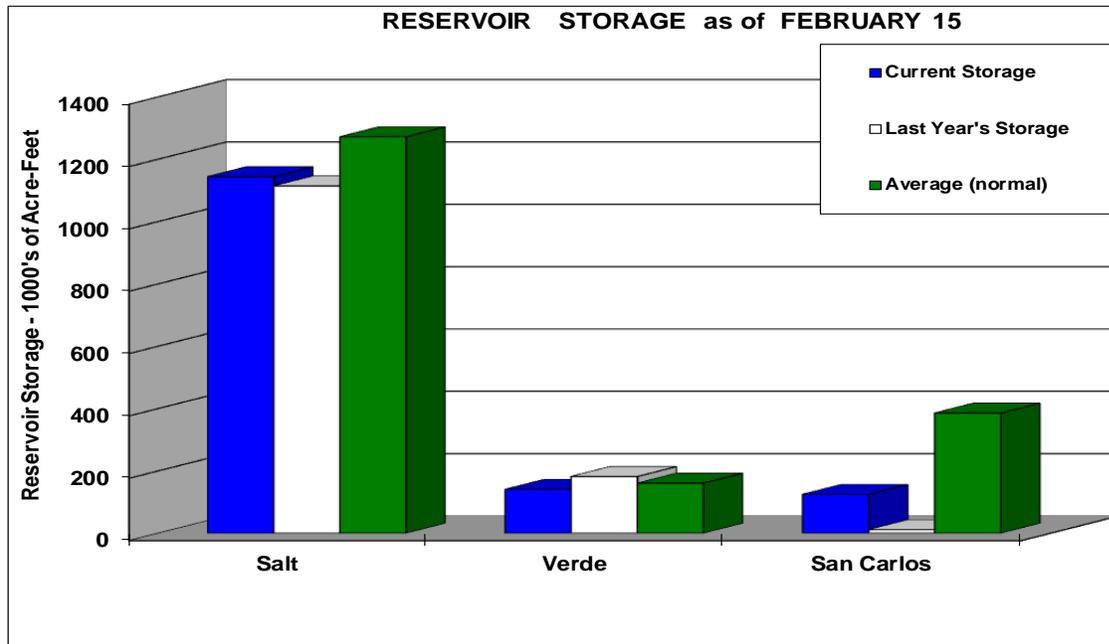


PRECIPITATION

Mountain data from NRCS SNOTEL sites and NWS Cooperator gages show that precipitation for the first half of February was well below normal in all major basins. Cumulative precipitation since October 1 is also 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 February 15, the Salt and Verde River reservoir system stands at 56 percent of capacity. San Carlos Reservoir remains well below normal at 14 percent of capacity.



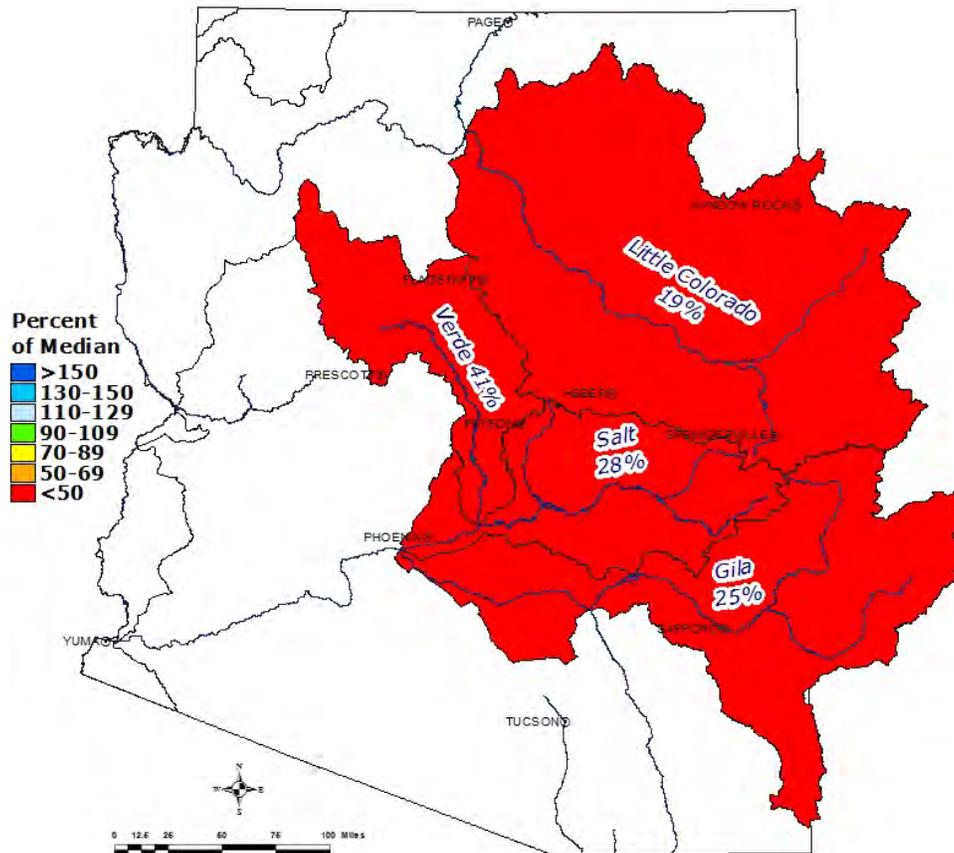
Key storage volumes displayed in thousands of acre-feet (x1000):

<u>Reservoir</u>	<u>Current Storage</u>	<u>Last Year Storage</u>	<u>30-Year Average</u>	<u>Storage Capacity</u>
Salt River System	1144.0	1113.9	1272.0	2025.8
Verde River System	140.8	182.1	160.8	287.4
San Carlos Reservoir	124.7	11.2	385.7	875.0
Lyman Lake	9.3	4.5	12.3	30.0
Lake Havasu	549.2	585.2	558.7	619.0
Lake Mohave	1670.5	1674.7	1685.0	1810.0
Lake Mead	12501.0	13829.0	20526.0	26159.0
Lake Powell	9675.0	12032.0	17170.0	24322.0

STREAMFLOW

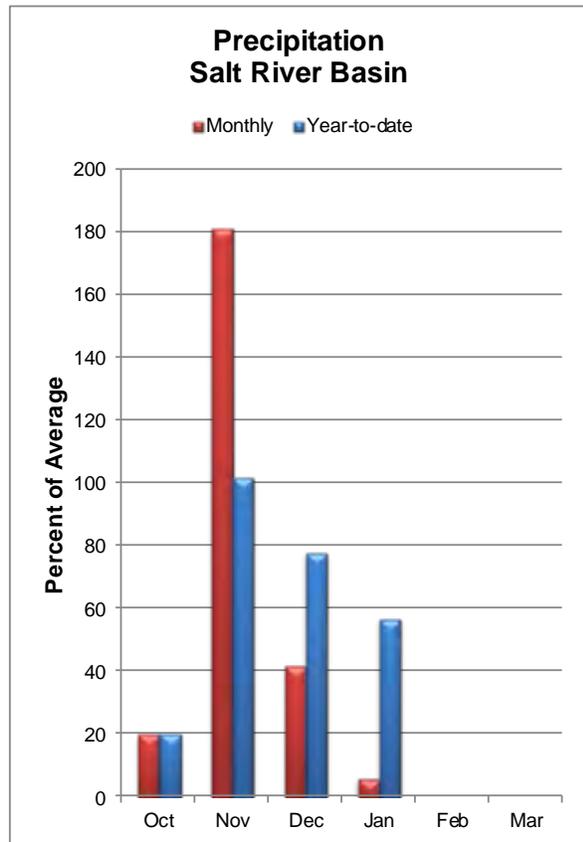
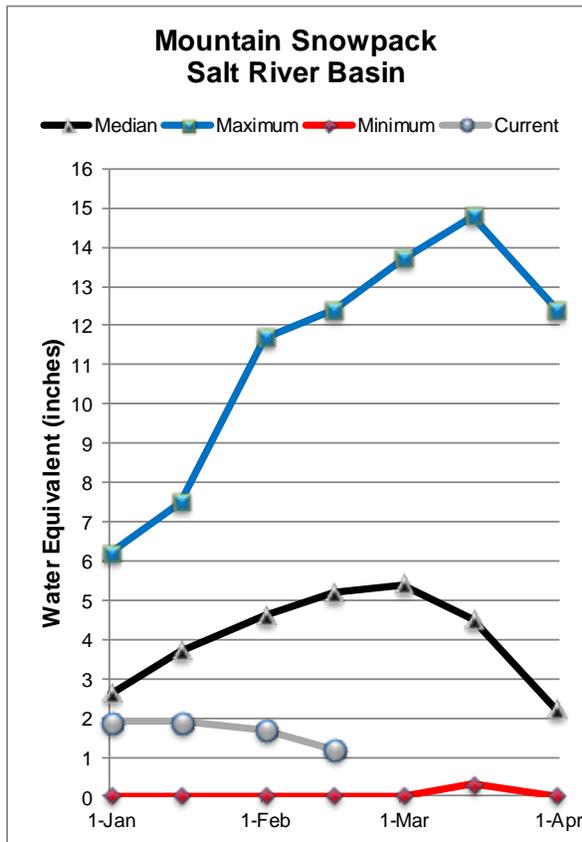
As of February 15, the forecast calls for well below normal streamflow for the spring runoff period, ranging from 41 percent of median in the Verde River above Horseshoe Dam to 19 percent of median in the Little Colorado River above Lyman Lake. The mid-month streamflow forecasts take into account the well below normal precipitation for the past two months as well as predictions for dry conditions to persist through the remainder of the spring. 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, 2014



SALT RIVER BASIN as of February 15, 2014

Well below normal streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 28% of median streamflow through May, while at Tonto Creek, the forecast calls for 33% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 23% of median.



**Salt River Basin
Streamflow Forecasts - February 16, 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	10% (KAF)	
Salt R nr Roosevelt ³	F15-MAY	26	50	73	28%	101	260
	FEB			14	36%		39
	MAR-MAY	23	46	68	28%	96	240
Tonto Ck ab Gun Ck nr Roosevelt ³	F15-MAY	1.45	4.8	8.8	33%	14.6	27
	FEB			0.7	7%		10.3

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

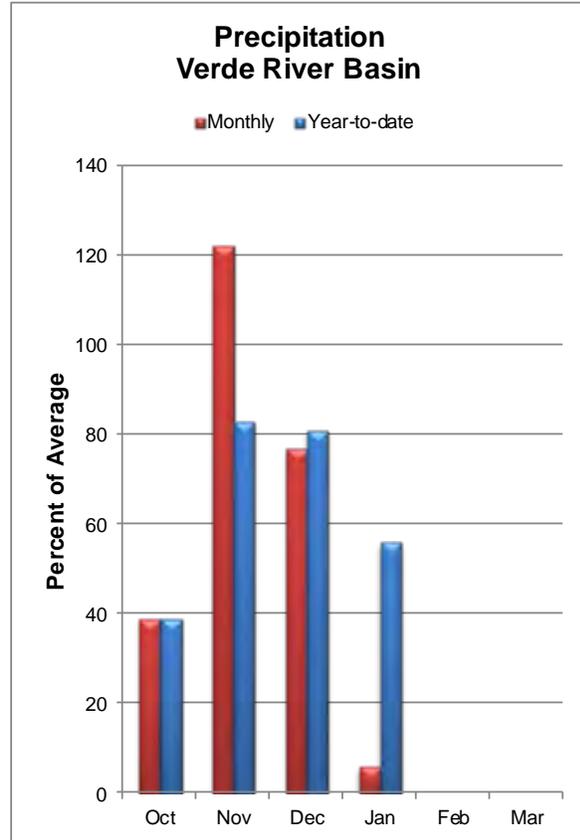
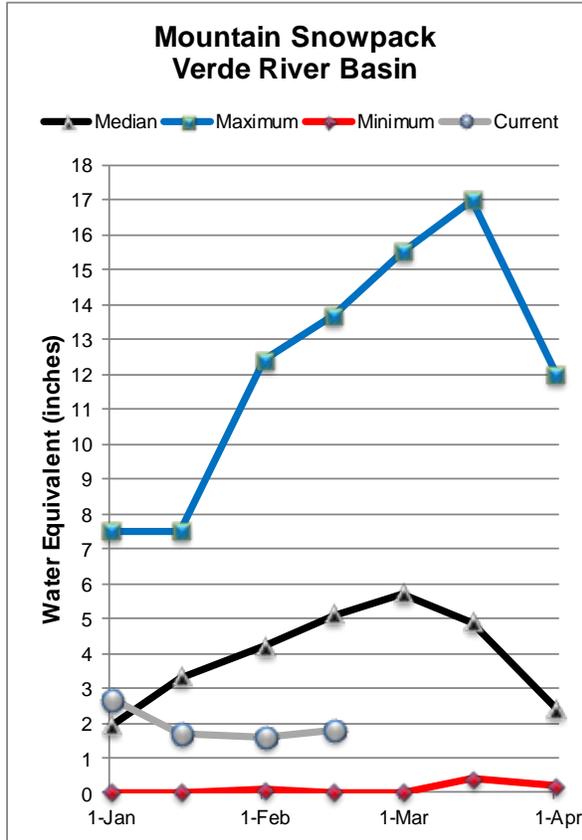
3) Median value used in place of average

Reservoir Storage End of February, 2014	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
SALT RIVER RESERVOIR SYSTEM	1144.0	1113.9	1272.0	2025.8
Basin-wide Total	1144.0	1113.9	1272.0	2025.8
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2014	# of Sites	% Median	Last Year % Median
SALT RIVER BASIN	12	23%	

VERDE RIVER BASIN as of February 15, 2014

Well below normal streamflow levels are forecast for the basin. In the Verde River, at Horseshoe Dam, the forecast calls for 41% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 35% of median.



Verde River Basin
Streamflow Forecasts - February 16, 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 ³	F15-MAY	30	31	50	41%	76	128	123
	FEB			14	40%			35

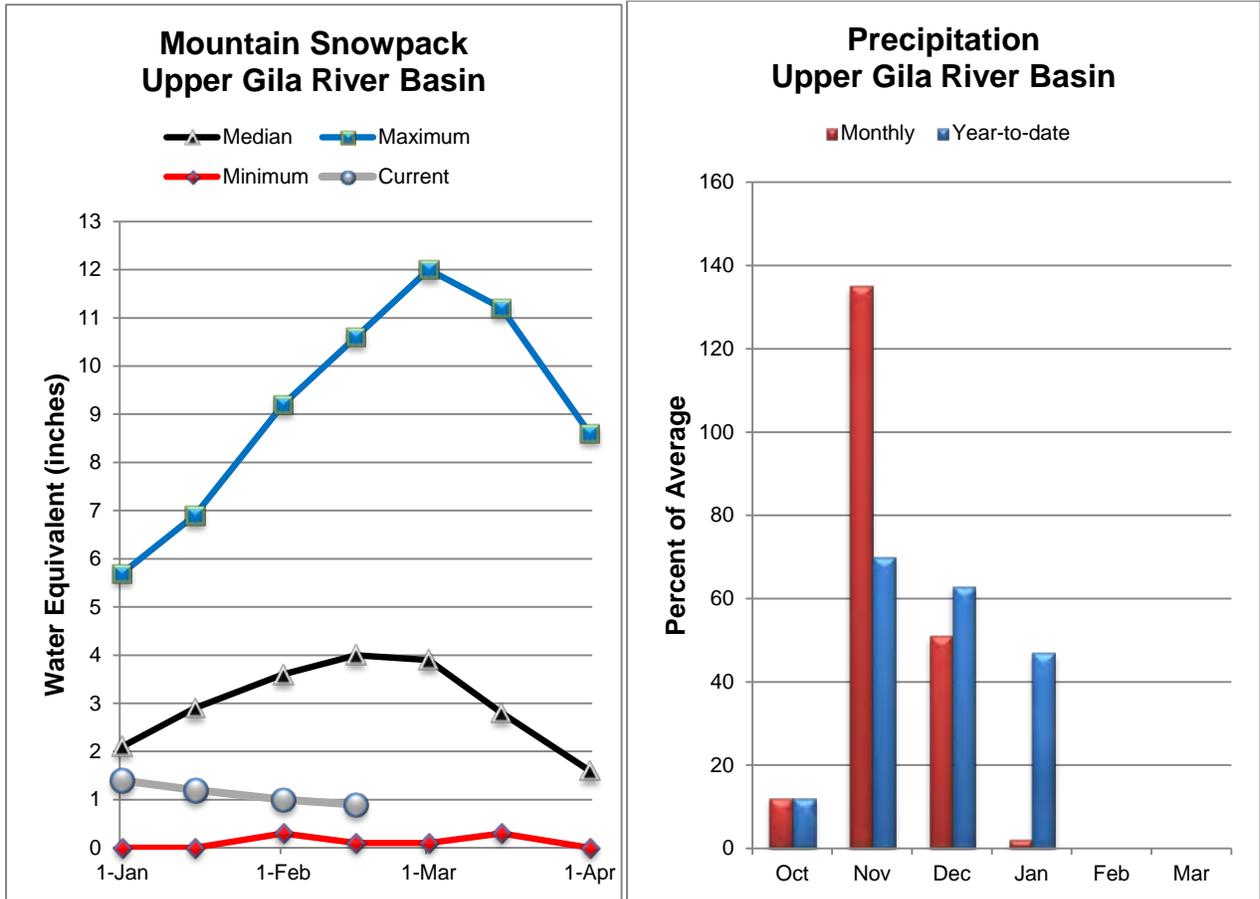
- 1) 90% and 10% exceedance probabilities are actually 95% and 5%
- 2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions
- 3) Median value used in place of average

Reservoir Storage End of February, 2014	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
VERDE RIVER RESERVOIR SYSTEM	140.8	182.1	160.8	287.4
Basin-wide Total	140.8	182.1	160.8	287.4
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2014	# of Sites	% Median	Last Year % Median
VERDE RIVER BASIN	12	35%	

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

Well below normal streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 35% of median streamflow levels through May. In the Gila River, near Solomon, the forecast calls for 25% of median streamflow levels through May. At San Carlos Reservoir, inflow to the lake is forecast at 22% of median through May. Snow survey measurements show the snowpack for this basin to be at 22% of median.



San Francisco-Upper Gila River Basin Streamflow Forecasts - February 16, 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 ³	F15-MAY	10	11	12	29%	16.6	25	41
Gila R bl Blue Ck nr Virden ³	F15-MAY	8	10	12.3	23%	21	37	53
San Francisco R at Glenwood ³	F15-MAY	2.5	2.9	5	30%	7.9	14.1	16.8
San Francisco R at Clifton ³	F15-MAY	8	9	15.9	35%	25	41	46
Gila R nr Solomon ³	F15-MAY	15	20	26	25%	43	77	103
	FEB			3.4	15%			23
San Carlos Reservoir Inflow ³	F15-MAY	0	3.2	15	22%	35	81	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

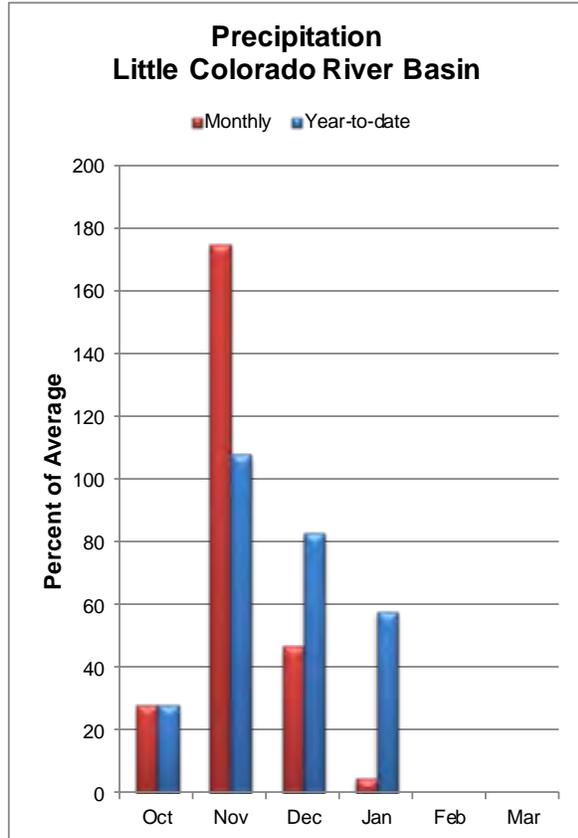
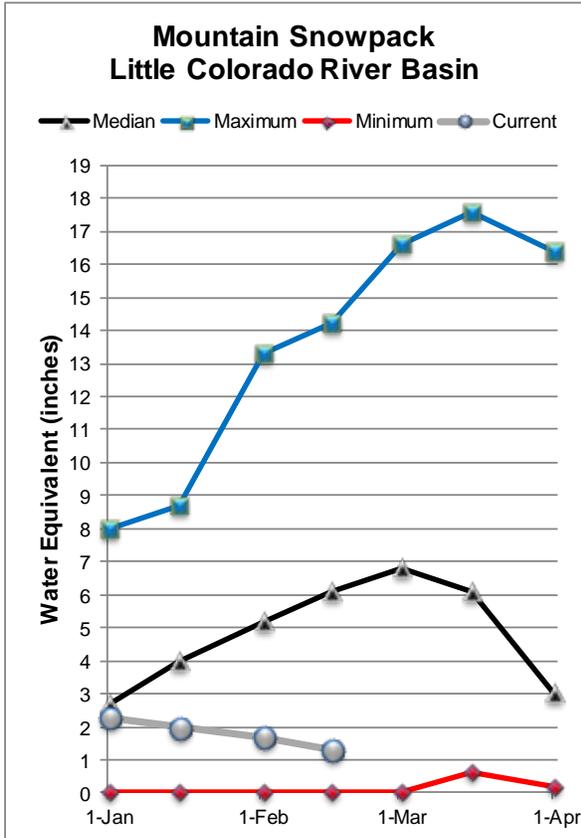
3) Median value used in place of average

Reservoir Storage End of February, 2014	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
SAN CARLOS RESERVOIR	124.7	11.2	385.7	875.0
Basin-wide Total	124.7	11.2	385.7	875.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2014	# of Sites	% Median	Last Year % Median
SAN FRANCISCO-UPPER GILA RIVER BASIN	11	22%	

LITTLE COLORADO RIVER BASIN as of February 15, 2014

Well below normal streamflow levels are forecast for the basin. In the Little Colorado River, above Lyman Lake, the forecast calls for 19% of median streamflow through June. At Blue Ridge (C.C. Cragin) Reservoir, inflow to the lake is forecast at 17% of median through May. Snowpacks along the southern headwaters of the Little Colorado River, and along the central Mogollon Rim, were measured at 21% and 17% of median, respectively.



**Little Colorado River Basin
Streamflow Forecasts - February 16, 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 ³	FEB-JUN	0.32	0.77	1.25	19%	1.9	3.2	6.6
Blue Ridge Reservoir Inflow ³	FEB-MAY	0.32	1.37	2.7	17%	4.8	9.4	16.3
Lake Mary Reservoir Inflow ³	FEB-MAY	0.23	0.6	1	23%	1.55	2.7	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

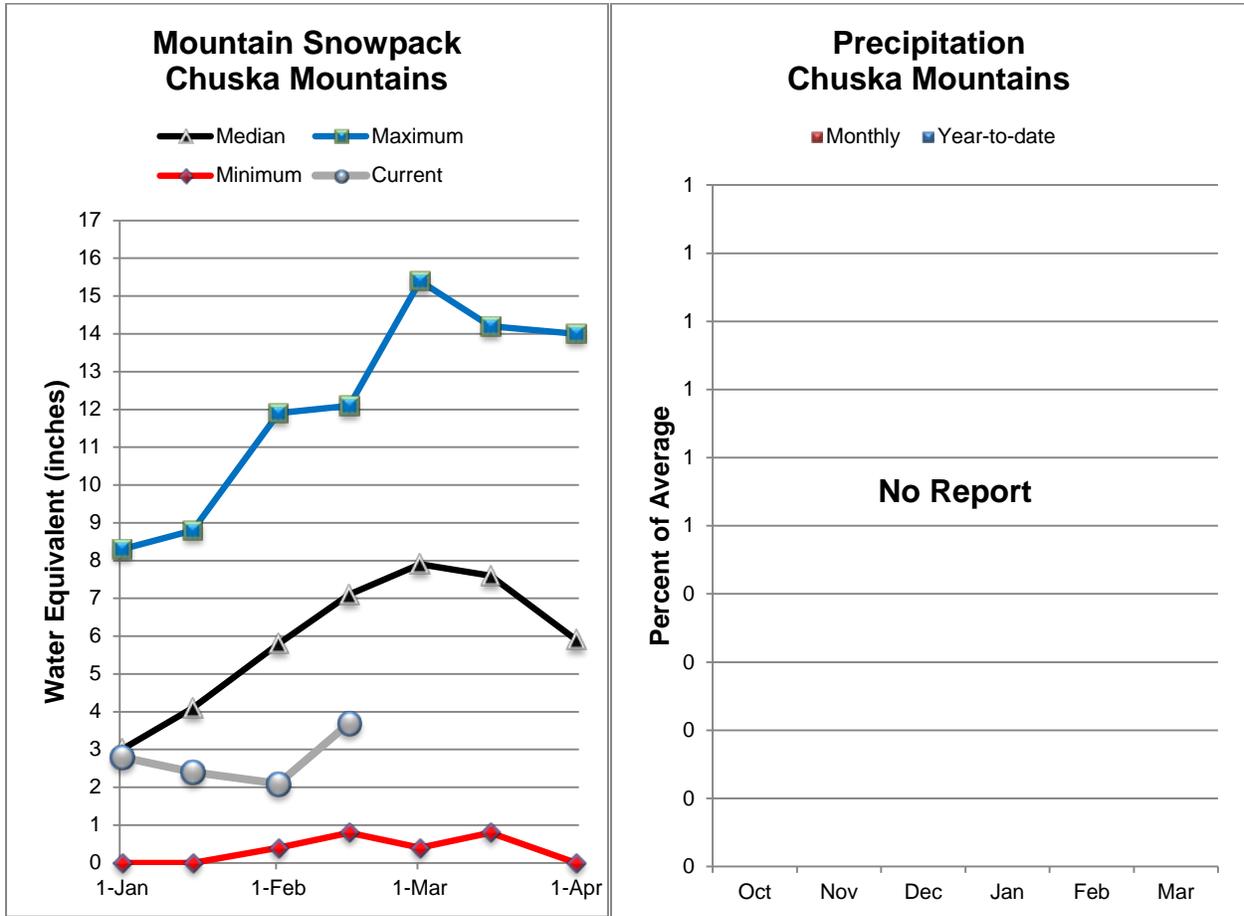
3) Median value used in place of average

Reservoir Storage End of February, 2014	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
LYMAN RESERVOIR	9.3	4.5	12.3	30.0
Basin-wide Total	9.3	4.5	12.3	30.0
# of reservoirs	1	1	1	1

Watershed Snowpack Analysis February 16, 2014	# of Sites	% Median	Last Year % Median
LITTLE COLORADO RIVER BASIN	10	21%	
CENTRAL MOGOLLON RIM	4	17%	

CHUSKA MOUNTAINS as of February 15, 2014

Snow survey measurements conducted by staff of the Navajo Nation Water Management Branch show the Chuska snowpack to be at 52% of median. Well below normal runoff is forecast for Wheatfields Creek, Captain Tom Wash, Bowl Canyon Creek, and Kinlichee Creek.



Chuska Mountains Streamflow Forecasts - February 16, 2014

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

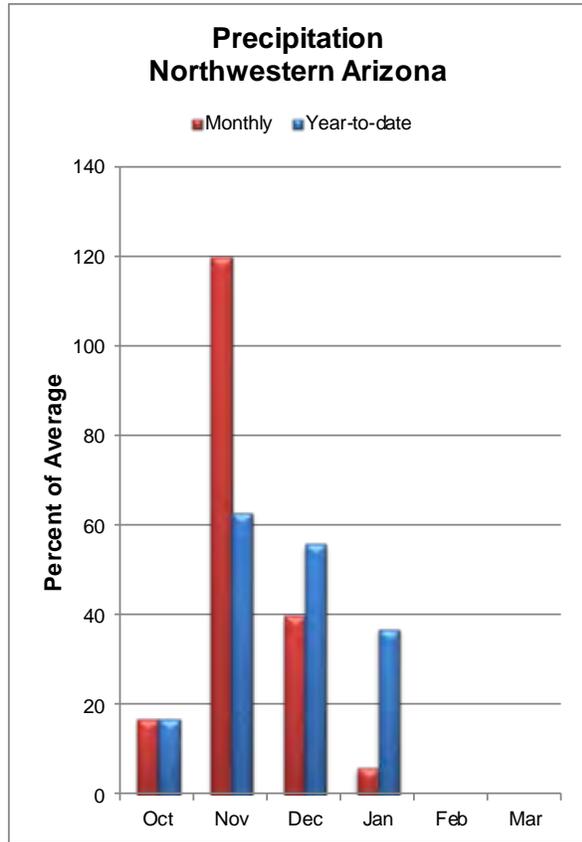
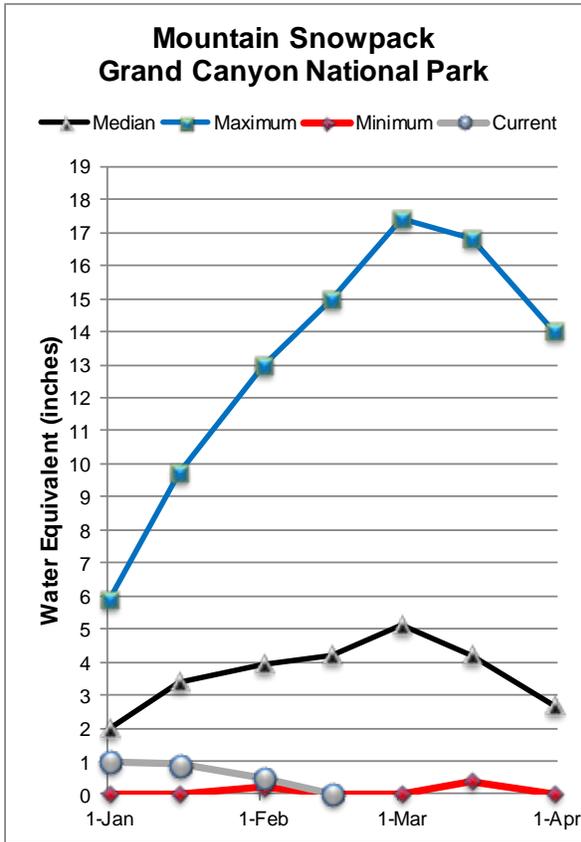
CHUSKA MOUNTAINS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Captain Tom Wash nr Two Gray Hills	MAR-MAY	0	0.11	0.4	15%	0.97	2.5	2.6
Wheatfields Ck nr Wheatfields	MAR-MAY	0.19	0.6	1	48%	1.5	2.4	2.1
Bowl Canyon Ck ab Asaayi Lake	MAR-MAY	0.13	0.37	0.6	46%	0.89	1.43	1.3
Kinlichee Ck	MAR-MAY	0	0.04	0.2	13%	0.56	1.6	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

Watershed Snowpack Analysis February 16, 2014	# of Sites	% Median	Last Year % Median
CHUSKA MOUNTAINS	6	52%	
DEFIANCE PLATEAU	2	9%	

NORTHWESTERN ARIZONA as of February 15, 2014

On the Colorado River, normal inflow to Lake Powell is forecast at 105% 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 0% of median.



Northwestern Arizona Streamflow Forecasts - February 16, 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 ²	APR-JUL	4680	6280	7500	105%	8830	11000	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 End of February, 2014	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
LAKE HAVASU	549.2	585.2	558.7	619.0
LAKE MOHAVE	1670.5	1674.7	1685.0	1810.0
LAKE MEAD	12501.0	13829.0	20526.0	26159.0
LAKE POWELL	9675.0	12032.0	17170.0	24322.0
Basin-wide Total	24395.7	28120.9	39939.7	52910.0
# of reservoirs	4	4	4	4

Watershed Snowpack Analysis February 16, 2014	# of Sites	% Median	Last Year % Median
NORTHWESTERN ARIZONA	1	0%	

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

Snowpack Summary for February 15, 2014

Map Num	SALT RIVER BASIN	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
5	BALDY	SNOTEL	9125'		1.6	7.5	21%
7	BEAVER HEAD	SNOTEL	7990'	2	1.9	3.6	53%
8	BEAVER HEAD	SC	8000'	0	0.0	2.6	0%
12	BUCK SPRING	SC	7400'	0	0.0	2.8	0%
16	CORONADO TRAIL	SNOTEL	8400'	0	0.0	2.2	0%
17	CORONADO TRAIL	SC	8350'	0	0.0	2.9	0%
19	FORT APACHE	SC	9160'	13	3.0	7.1	42%
24	HANNAGAN MEADOWS	SNOTEL	9020'	12	3.7	9.6	39%
29	MAVERICK FORK	SNOTEL	9200'	4	1.8	7.9	23%
34	NUTRIOSO	SC	8500'	0	0.0	1.0	0%
35	NUTRIOSO	SNOTEL	8500'	0	0.0		
42	WILDCAT	SNOTEL	7850'	0	0.1	3.4	3%
44	WORKMAN CREEK	SNOTEL	6900'	0	0.0	5.8	0%
Basin Index							23%
# of sites							12

Map Num	VERDE RIVER BASIN	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
2	BAKER BUTTE	SNOTEL	7300'	0	0.0	5.2	0%
3	BAKER BUTTE NO. 2	SC	7700'	13	4.0	8.3	48%
4	BAKER BUTTE SMT	SNOTEL	7700'	17	5.1		
6	BAR M	SNOTEL	6393'	0	0.0		
13	CHALENDER	SC	7100'	1	0.4		
14	CHALENDER	SNOTEL	7100'	0	0.0	2.0	0%
20	FORT VALLEY	SC	7350'	0	0.0	2.2	0%
21	FORT VALLEY	SNOTEL	7350'	0	0.0		
22	FRY	SNOTEL	7200'	8	3.0	6.3	48%
25	HAPPY JACK	SNOTEL	7630'	9	3.4	5.3	64%
26	HAPPY JACK	SC	7630'	0	0.0	4.8	0%
30	MORMON MOUNTAIN	SNOTEL	7500'	0	0.3	4.3	7%
31	MORMON MOUNTAIN SUMMIT #2	SC	8470'	14	3.8	7.8	49%
32	MORMON MTN SUMMIT	SNOTEL	8500'	12	3.7		
33	NEWMAN PARK	SC	6750'	0	0.0	2.6	0%
41	WHITE HORSE LAKE	SNOTEL	7180'	0	0.0	4.5	0%
43	WILLIAMS SKI RUN	SC	7720'	14	5.2	7.5	69%
Basin Index							35%
# of sites							12

Map Num	SAN FRANCISCO PEAKS	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
37	SNOW BOWL #2	SC	11200'	22	5.8	14.9	39%
38	SNOWSLIDE CANYON	SNOTEL	9730'	36	10.5	12.5	84%
Basin Index							59%
# of sites							2

Map Num	SAN FRANCISCO-UPPER GILA RIVER BASIN	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
8	BEAVER HEAD	SNOTEL	7990'	2	1.9	3.6	53%
9	BEAVER HEAD	SC	8000'	0	0.0	2.6	0%
16	CORONADO TRAIL	SNOTEL	8400'	0	0.0	2.2	0%
17	CORONADO TRAIL	SC	8350'	0	0.0	2.9	0%
	FRISCO DIVIDE	SNOTEL	8000'	0	0.2	2.9	7%
24	HANNAGAN MEADOWS	SNOTEL	9020'	12	3.7	9.6	39%
	LOOKOUT MOUNTAIN	SNOTEL	8500'		0.2	2.5	8%
34	NUTRIOSO	SC	8500'	0	0.0	1.0	0%
35	NUTRIOSO	SNOTEL	8500'	0	0.0		
	SIGNAL PEAK	SNOTEL	8360'	0	0.0	4.1	0%
	SILVER CREEK DIVIDE	SNOTEL	9000'	9	2.4	7.4	32%
	STATE LINE	SC	8000'	1	0.4	2.0	20%
Basin Index							22%

Map Num	LITTLE COLORADO RIVER BASIN	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
2	BAKER BUTTE	SNOTEL	7300'	0	0.0	5.2	0%
3	BAKER BUTTE NO. 2	SC	7700'	13	4.0	8.3	48%
4	BAKER BUTTE SMT	SNOTEL	7700'	17	5.1		
6	BALDY	SNOTEL	9125'		1.6	7.5	21%
12	BUCK SPRING	SC	7400'	0	0.0	2.8	0%
15	CHEESE SPRINGS	SC	8700'	9	1.8	5.0	36%
19	FORT APACHE	SC	9160'	13	3.0	7.1	42%
27	HEBER	SNOTEL	7640'	1	0.2	5.1	4%
28	LAKE MARY	SC	6930'	0	0.0	2.6	0%
29	MAVERICK FORK	SNOTEL	9200'	4	1.8	7.9	23%
36	PROMONTORY	SNOTEL	7930'	1	0.5	9.5	5%
Basin Index							21%
# of sites							10

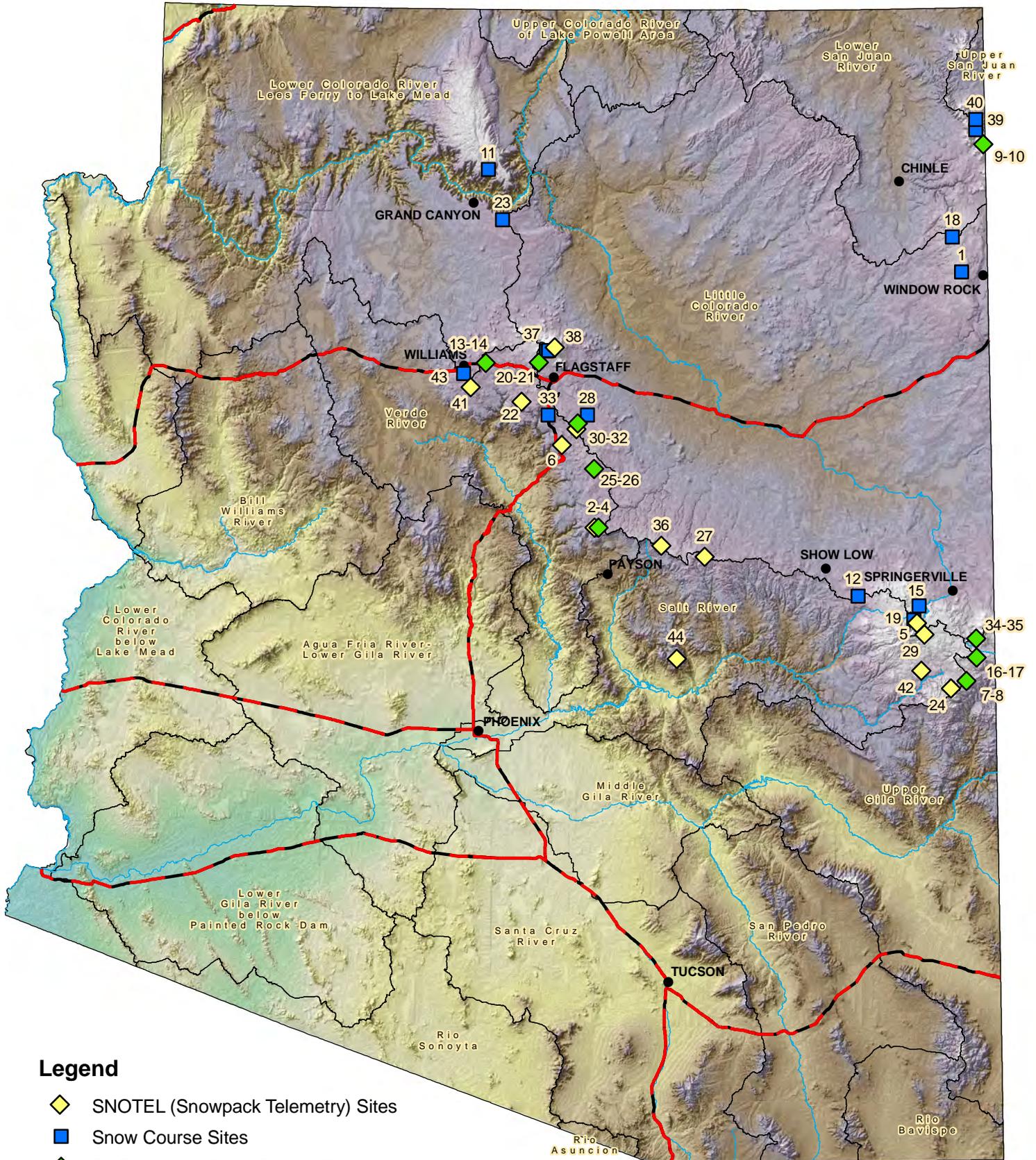
Map Num	CENTRAL MOGOLLON RIM	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
2	BAKER BUTTE	SNOTEL	7300'	0	0.0	5.2	0%
3	BAKER BUTTE NO. 2	SC	7700'	13	4.0	8.3	48%
4	BAKER BUTTE SMT	SNOTEL	7700'	17	5.1		
27	HEBER	SNOTEL	7640'	1	0.2	5.1	4%
36	PROMONTORY	SNOTEL	7930'	1	0.5	9.5	5%
Basin Index							17%
# of sites							4

Map Num	CHUSKA MOUNTAINS	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
9	BEAVER SPRING	SC	9220'	18	4.9	8.5	58%
10	BEAVER SPRING	SNOTEL	9200'	12	4.4		
	BOWL CANYON	SC	8980'	14	3.1	7.2	43%
	HIDDEN VALLEY	SC	8480'	9	2.1		
	MISSIONARY SPRING	SC	7940'	2	0.6	4.0	15%
39	TSAILE CANYON #1	SC	8160'	14	4.1	6.0	68%
40	TSAILE CANYON #3	SC	8920'	20	5.8	9.0	64%
	WHISKEY CREEK	SC	9050'	16	3.6	8.0	45%
	NAVAJO WHISKEY CK	SNOTEL	9050'	1	1.6		
Basin Index							52%
# of sites							6

Map Num	DEFIANCE PLATEAU	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
1	ARBABS FOREST	SC	7680'	1	0.2	2.8	7%
18	FLUTED ROCK	SC	7800'	2	0.4	3.7	11%
Basin Index							9%
# of sites							2

Map Num	NORTHWESTERN ARIZONA	Network	Elevation	Depth (in)	SWE (in)	Median (in)	% Median
11	BRIGHT ANGEL	SC	8400'			6.6	
23	GRAND CANYON	SC	7500'	0	0.0	1.7	0%
Basin Index							0%
# of sites							1

Arizona Snow Survey Data Sites



Legend

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

