



Natural  
Resources  
Conservation  
Service

# Arizona Basin Outlook Report February 1, 2009



**Issued by**

David White  
Acting Chief  
Natural Resources Conservation Service  
U.S. Department of Agriculture

**Released by**

David L. McKay  
State Conservationist  
Natural Resources Conservation Service  
Phoenix, Arizona

## **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.



### ***For more water supply and resource management information, contact:***

Dino DeSimone  
Water Supply Specialist  
230 N. First Ave., Suite 509  
Phoenix, AZ 85003-1706  
Phone: (602) 280-8786  
Email: [dino.desimone@az.usda.gov](mailto:dino.desimone@az.usda.gov)

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# ARIZONA Water Supply Outlook Report as of February 1, 2009

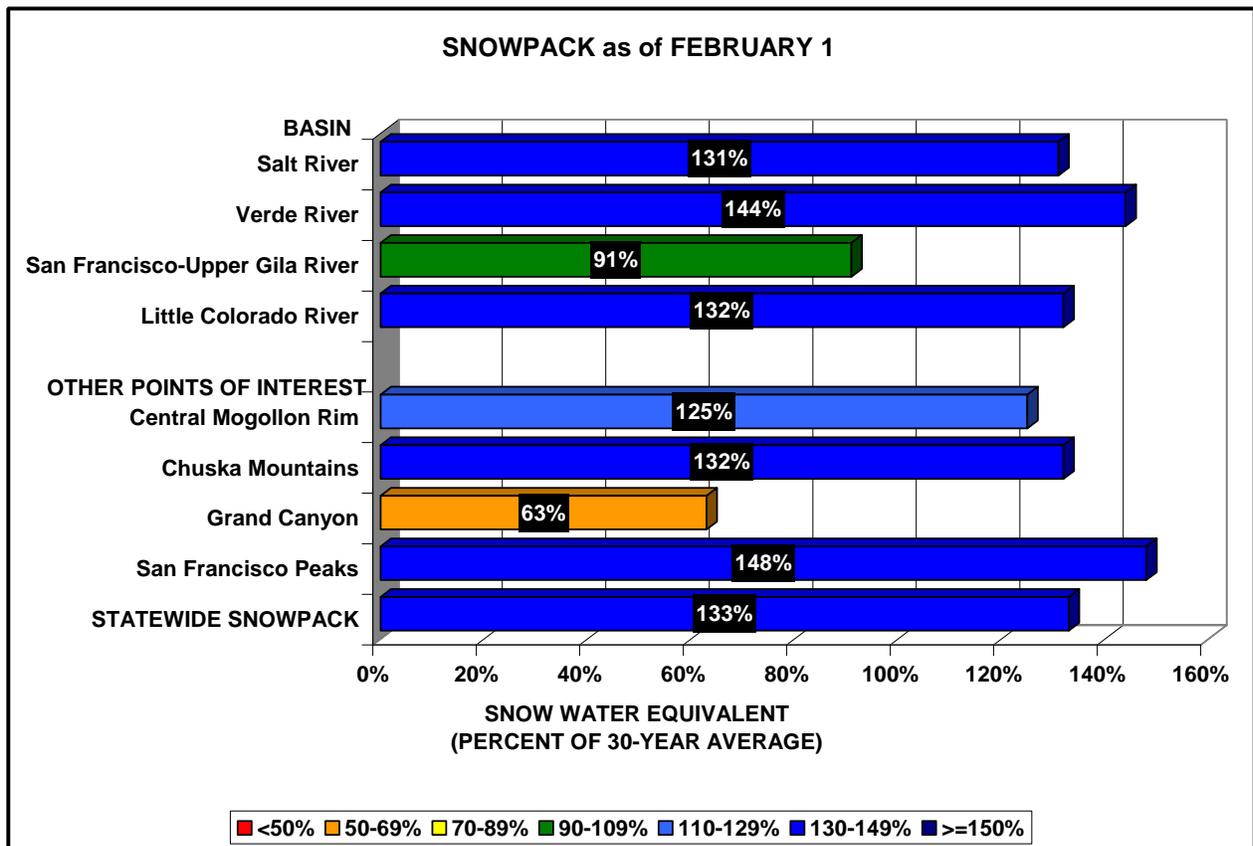
## Useful Websites

- ◆ A full range of Snow Survey and Water Supply Forecasting products is available at:  
<http://www.az.nrcs.usda.gov/snow>
- ◆ Information on current crop, livestock, range and pasture conditions in Arizona is available at:  
[http://www.nass.usda.gov/Statistics\\_by\\_State/Arizona/Publications](http://www.nass.usda.gov/Statistics_by_State/Arizona/Publications)
- ◆ Information on current hydrometeorological conditions in Arizona is available at:  
<http://www.wrh.noaa.gov/psr/hydrology>

## SUMMARY

As of February 1, basin snowpack levels range from normal at 91 percent of average to above normal at 144 percent of average. The statewide snowpack remains above normal at 133 percent of average, despite the lack of any appreciable additions during the past month. The long-range forecast generally calls for normal to below normal streamflow levels for the spring runoff period. The Salt and Verde River reservoirs stand at 93 percent of capacity.

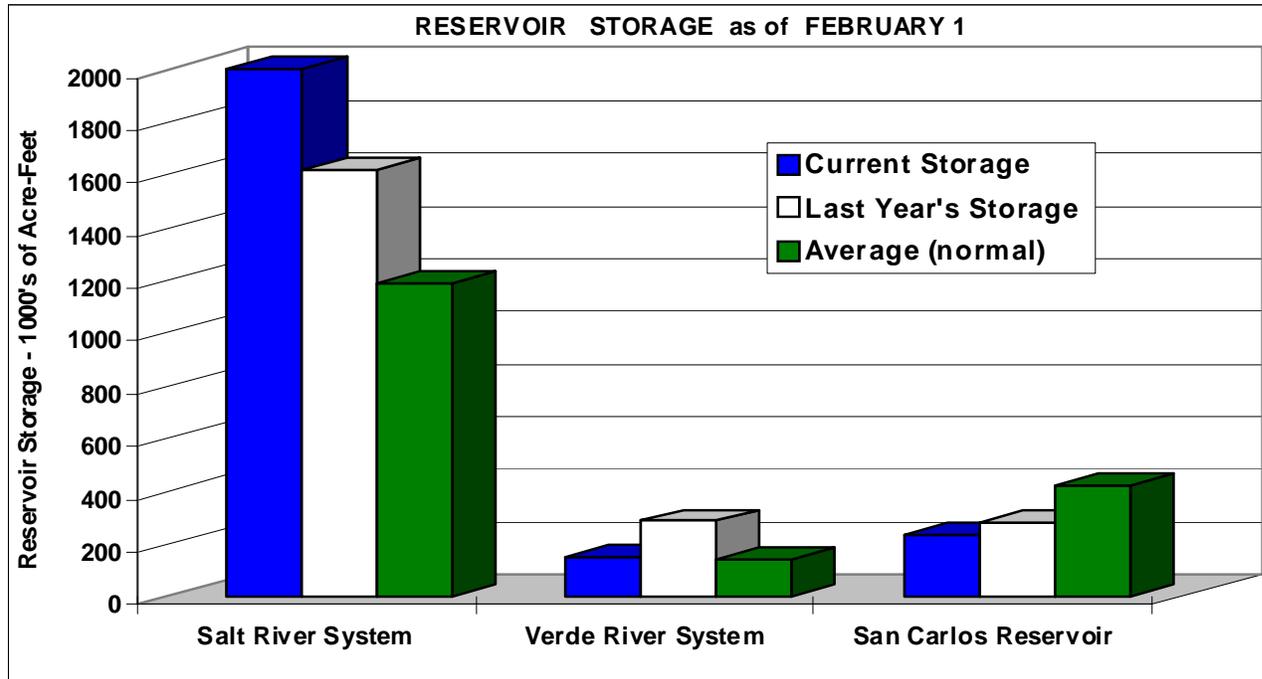
## SNOWPACK



## PRECIPITATION

Mountain data from NRCS SNOTEL sites show that cumulative precipitation since October 1 remains at or above average in all basins except for the San Francisco – Upper Gila River Basin, which stands at 80% of average precipitation for the water year. Please refer to the precipitation bar graphs found in this report for more information on precipitation levels in the basins.

## RESERVOIR STORAGE



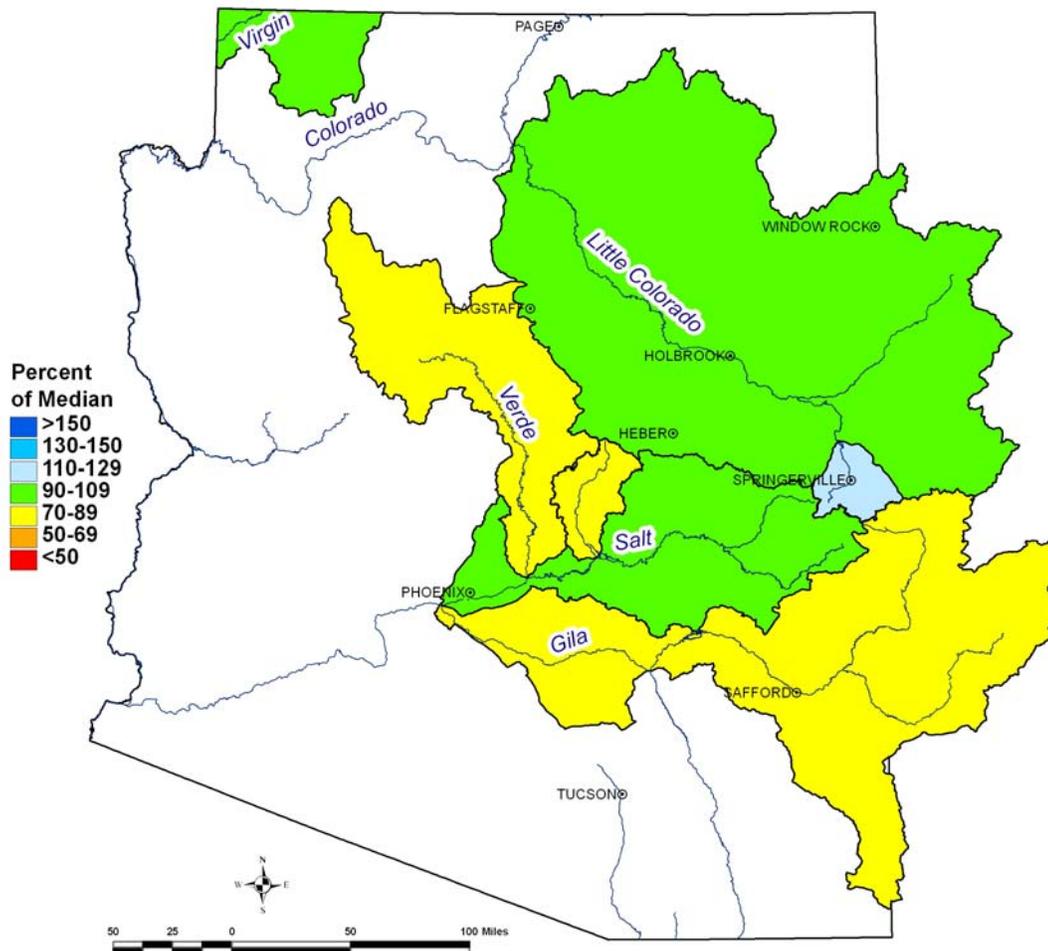
Key storage volumes displayed in thousands of acre-feet (x1000):

<u>Reservoir</u>	<u>Current Storage</u>	<u>Last Year Storage</u>	<u>30-Year Average</u>
Salt River System	1999.4	1615.3	1187.0
Verde River System	146.9	282.5	142.2
San Carlos Reservoir	227.5	282.1	421.8
Lyman Lake	14.2	9.0	14.7
Lake Pleasant	613.0	659.0	----
Lake Havasu	559.3	555.0	551.8
Lake Mohave	1647.4	1662.8	1672.3
Lake Mead	12573.0	13017.0	21992.0
Lake Powell	13147.0	10880.0	18463.0

## STREAMFLOW

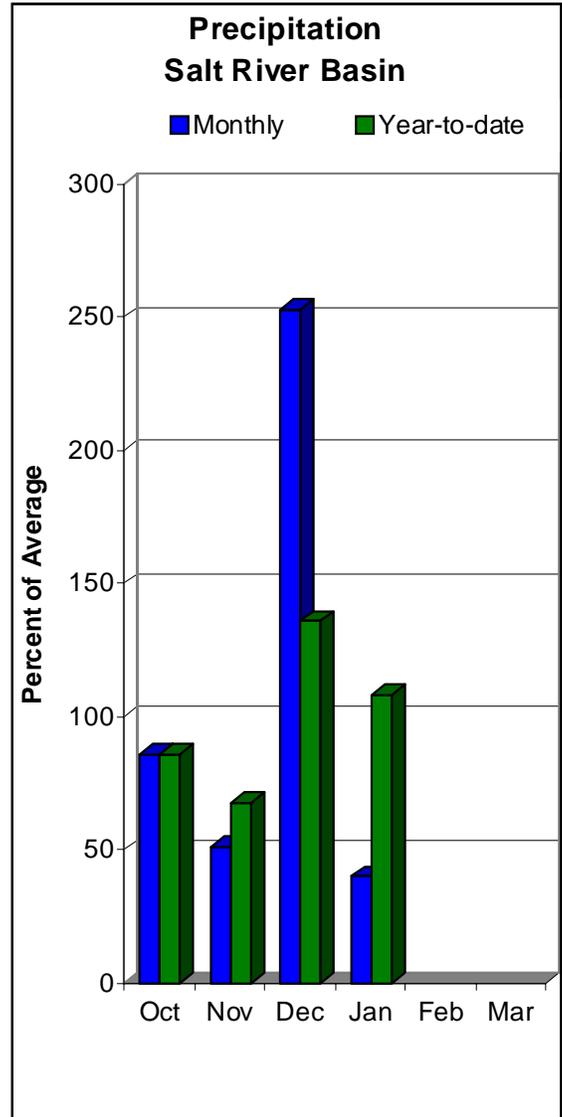
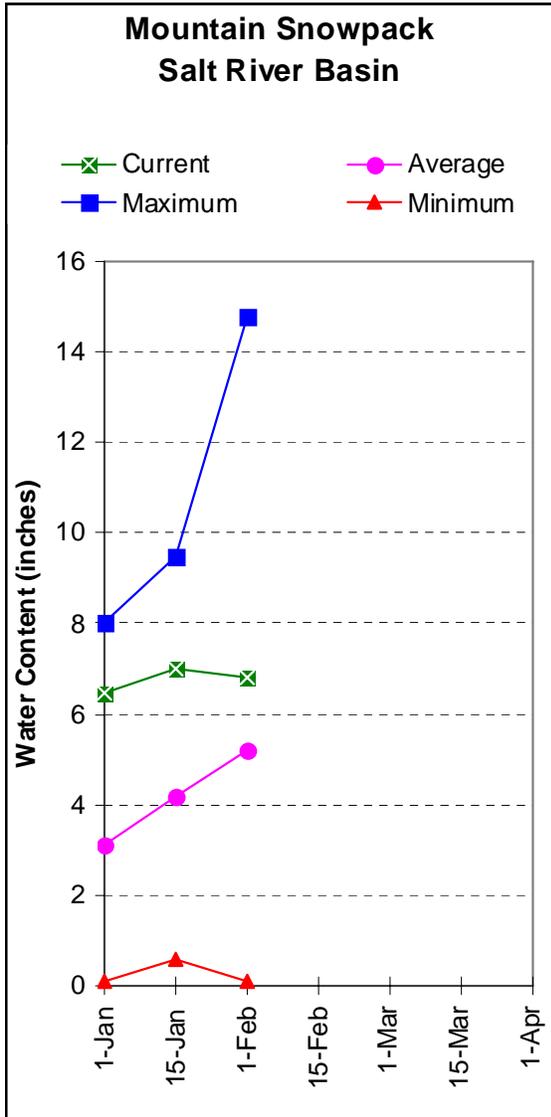
As of February 1, the long-range forecast generally calls for normal to below normal streamflow levels for the spring runoff period. The exception is the Chuska Mountains on the Navajo Nation, where the forecast calls for above normal streamflow levels. For the Virgin River, Little Colorado River, and Salt River, water users can expect normal streamflow levels. For the Verde River, San Francisco River, and Upper Gila River, the forecast calls for below normal streamflow levels. 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 1, 2009



## SALT RIVER BASIN as of February 1, 2009

Median to below median streamflow levels are forecast for the basin. In the Salt River, near Roosevelt, the forecast calls for 93% of median streamflow through May, while at Tonto Creek, the forecast calls for 86% of median streamflow through May. Snow survey measurements show the Salt snowpack to be at 131% of average.



SALT RIVER BASIN  
Streamflow Forecasts - February 1, 2009

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===>						30 Yr Med (1000AF)
	Chance of Exceeding *						
	90% (1000AF)	70% (1000AF)	50% (1000AF) (% MED.)	30% (1000AF)	10% (1000AF)		
Salt River nr Roosevelt							
FEB-MAY	149	245	330	93	435	620	355
FEBRUARY	26	46	65	141	88	132	46
Tonto Creek ab Gun Creek nr Roosevelt							
FEB-MAY	7.9	24	43	86	70	126	50
FEBRUARY	2.4	9.5	17.0	135	27	45	12.6

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1971-2000 base period.

SALT RIVER BASIN  
Reservoir Storage (1000AF) End of January

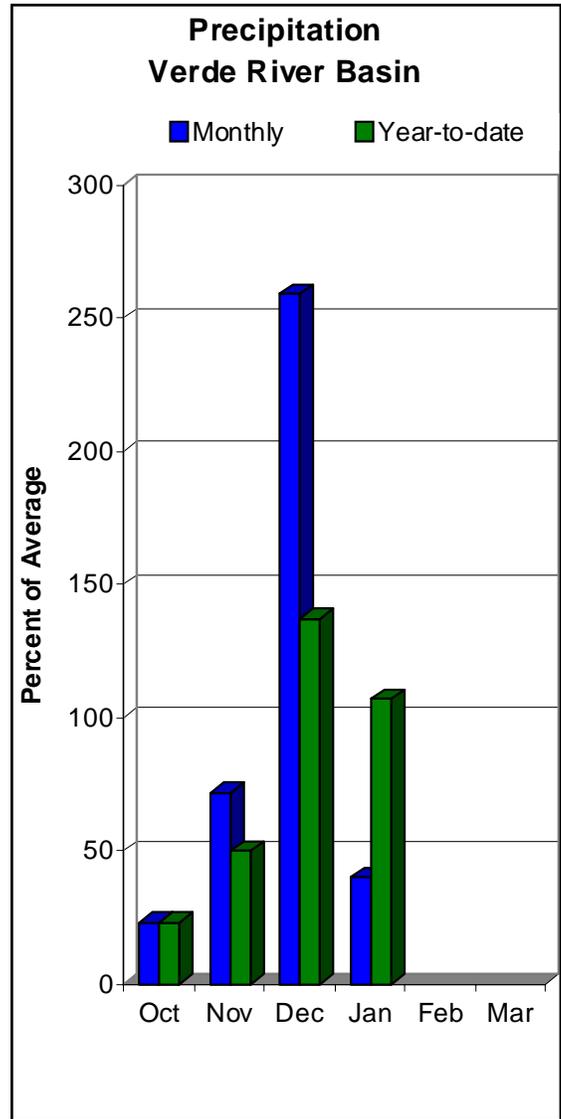
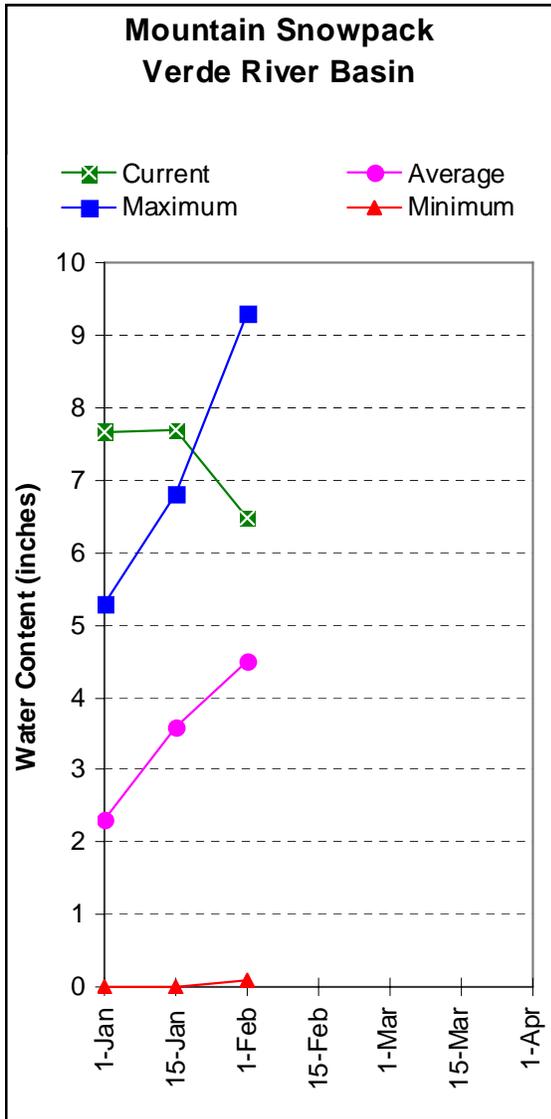
Reservoir	Usable Capacity	***** This Year	Usable Storage Last Year	***** Average
SALT RIVER RES SYSTEM	2025.8	1999.4	1615.3	1187.0

SALT RIVER BASIN  
Watershed Snowpack Analysis - February 1, 2009

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SALT RIVER BASIN	8	98	131

## VERDE RIVER BASIN as of February 1, 2009

Below median streamflow levels are forecast for the basin. In the Verde River, at Horseshoe Dam, the forecast calls for 85% of median streamflow through May. Snow survey measurements show the Verde snowpack to be at 144% of average.



VERDE RIVER BASIN  
Streamflow Forecasts - February 1, 2009

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===>						30 Yr Med (1000AF)
	Chance of Exceeding *						
	90%	70%	50%	30%	10%		
	(1000AF)	(1000AF)	(1000AF) (% MED.)	(1000AF)	(1000AF)	(1000AF)	
Verde River abv Horseshoe Dam							
FEB-MAY	74	125	170	85	225	325	200
FEBRUARY	14.3	30	45	129	65	103	35

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1971-2000 base period.

VERDE RIVER BASIN  
Reservoir Storage (1000AF) End of January

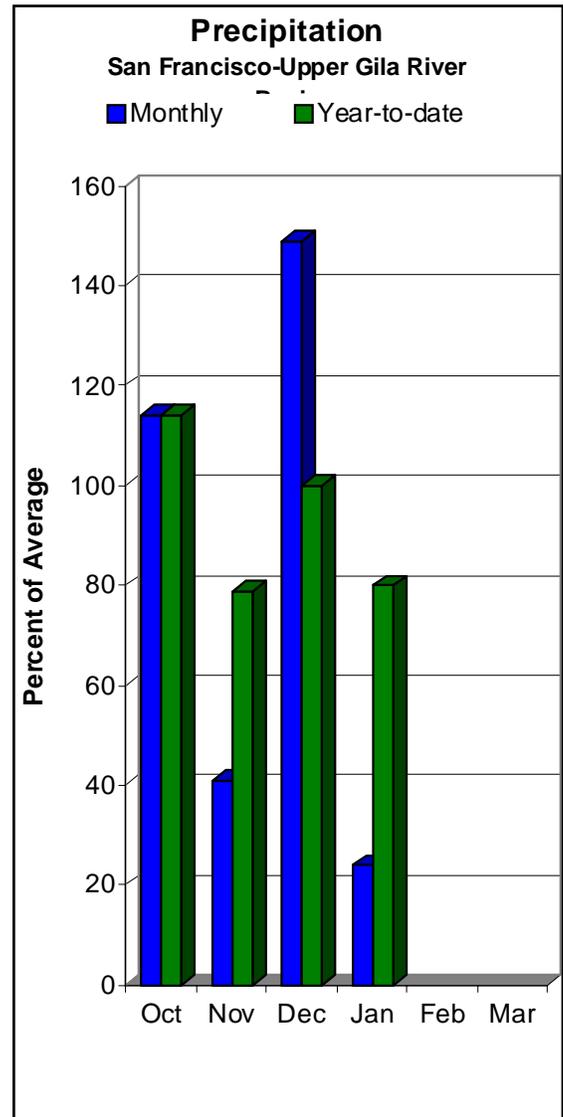
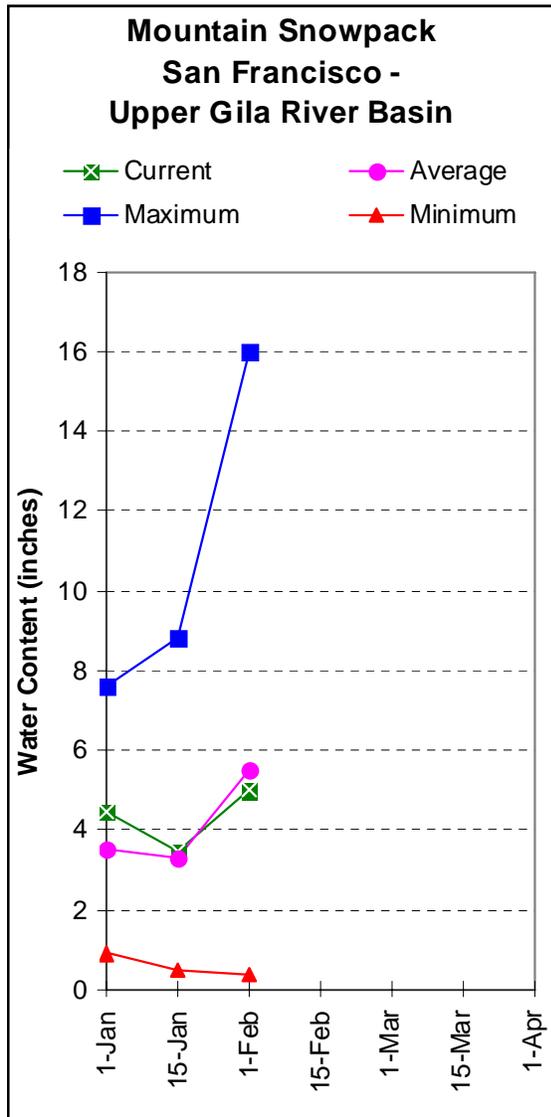
Reservoir	Usable	***** Usable Storage *****		*****
	Capacity	This Year	Last Year	Average
VERDE RIVER RES SYSTEM	287.4	146.9	282.5	142.2

VERDE RIVER BASIN  
Watershed Snowpack Analysis - February 1, 2009

Watershed	Number of	This Year as Percent of	
	Data Sites	Last Year	Average
VERDE RIVER BASIN	10	94	144
SAN FRANCISCO PEAKS	3	73	148

## SAN FRANCISCO-UPPER GILA RIVER BASIN as of February 1, 2009

Below median to well below median streamflow levels are forecast for the basin. In the San Francisco River, at Clifton, the forecast calls for 78% of median streamflow levels through May, while in the Gila River, near Solomon, the forecast calls for 65% of median streamflow levels through May. At San Carlos Reservoir, inflow to the lake is forecast at 74% of median through May. Snow survey measurements show the snowpack for this basin to be at 91% of average.



SAN FRANCISCO - UPPER GILA RIVER BASIN  
Streamflow Forecasts - February 1, 2009

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===>						30 Yr Med (1000AF)
	Chance of Exceeding *						
	90% (1000AF)	70% (1000AF)	50% (1000AF) (% MED.)	30% (1000AF)	10% (1000AF)		
Gila River at Gila FEB-MAY	20	29	37	70	46	61	53
Gila River nr Virden FEB-MAY	16.0	21	43	57	65	97	75
San Francisco River at Glenwood FEB-MAY	10.9	15.9	20	83	25	33	24
San Francisco River at Clifton FEB-MAY	18.0	23	46	78	69	102	59
Gila River nr Solomon FEB-MAY	25	37	93	65	149	230	144
	FEBRUARY		27	113			24
San Carlos Reservoir Inflow FEB-MAY	10.0	20	62	74	104	165	84

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1971-2000 base period.

SAN FRANCISCO - UPPER GILA RIVER BASIN  
Reservoir Storage (1000AF) End of January

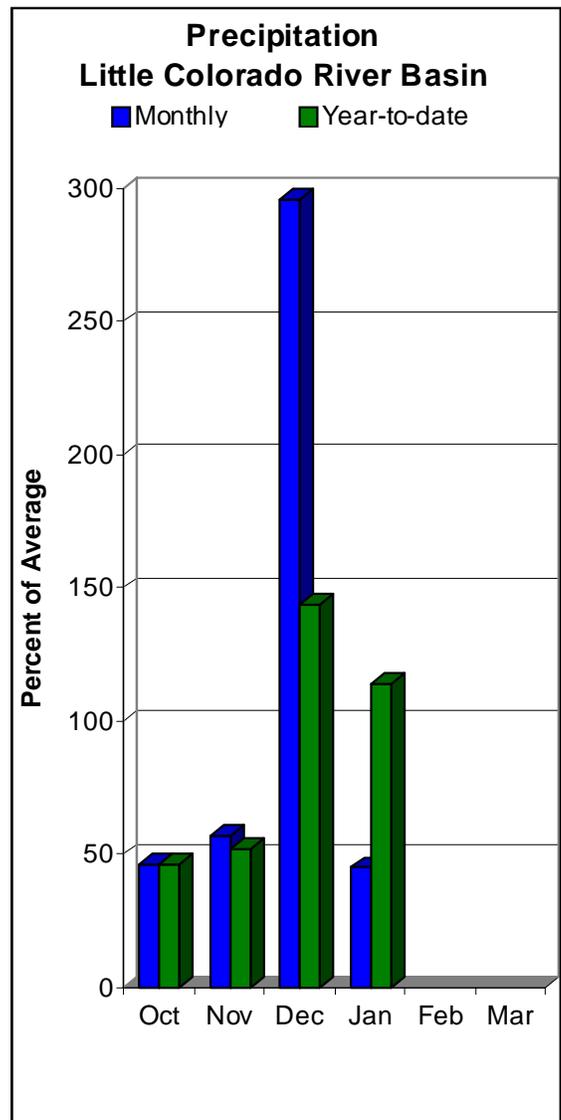
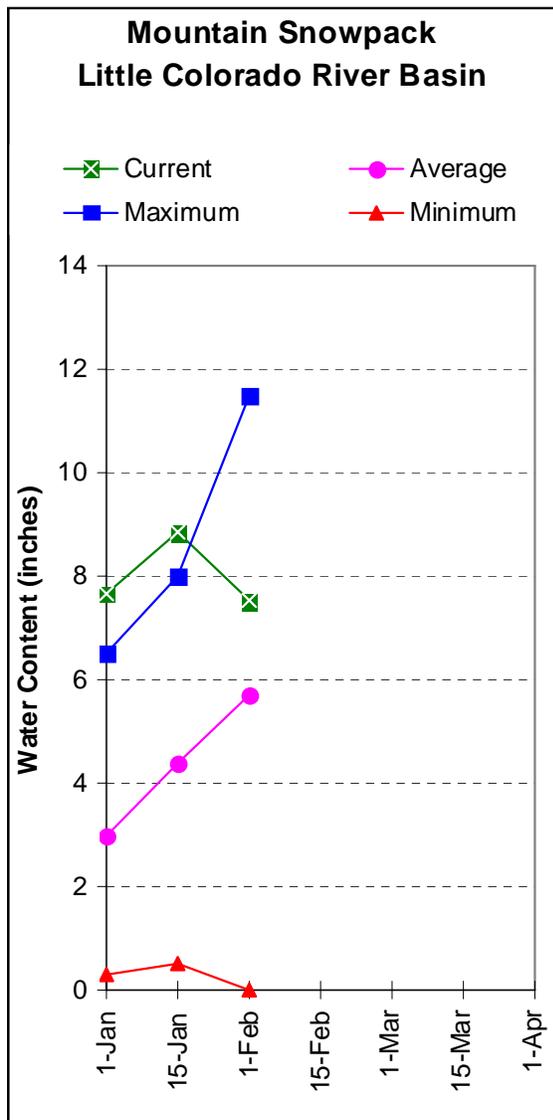
Reservoir	Usable Capacity	***** Usable Storage *****		
		This Year	Last Year	Average
SAN CARLOS	875.0	227.5	282.1	421.8
PAINTED ROCK DAM		NO REPORT		

SAN FRANCISCO - UPPER GILA RIVER BASIN  
Watershed Snowpack Analysis - February 1, 2009

Watershed	Number of Data Sites	This Year as Percent of	
		Last Year	Average
SAN FRANCISCO - UPPER GILA R	11	68	91

## LITTLE COLORADO RIVER BASIN as of February 1, 2009

Median to above median streamflow levels are forecast for the basin. In the Little Colorado River, at Lyman Lake, the forecast calls for 113% of median streamflow through June, while at Woodruff, the forecast calls for 107% of median streamflow through May. Snowpacks along the southern headwaters of the Little Colorado River, and along the central Mogollon Rim, were measured at 132% and 125% of average, respectively.



LITTLE COLORADO RIVER BASIN  
Streamflow Forecasts - February 1, 2009

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===>						30 Yr Med (1000AF)
	Chance of Exceeding * 90% (1000AF)   70% (1000AF)   50% (1000AF) (% MED.)   30% (1000AF)   10% (1000AF)						
Little Colorado River abv Lyman Lake							
FEB-JUN	2.50	5.30	8.00	113	11.50	18.30	7.10
Rio Nutria nr Ramah							
FEB-MAY	0.15	1.04	2.40	80	4.60	9.80	3.00
Ramah Reservoir Inflow							
FEB-MAY	0.00	0.10	1.33	80	3.10	5.80	1.66
Zuni River abv Black Rock Reservoir							
FEB-MAY	0.48	0.83	1.15	85	1.54	2.30	1.36
Little Colorado River at Woodruff							
FEB-MAY	0.50	1.28	3.00	107	4.70	7.20	2.80
Blue Ridge Reservoir Inflow							
FEB-MAY	6.4	11.4	16.0	98	22	32	16.3
Lake Mary Inflow							
FEB-MAY	2.30	3.70	5.00	104	6.50	9.30	4.80

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average and median are computed for the 1971-2000 base period.

LITTLE COLORADO RIVER BASIN  
Reservoir Storage (1000AF) End of January

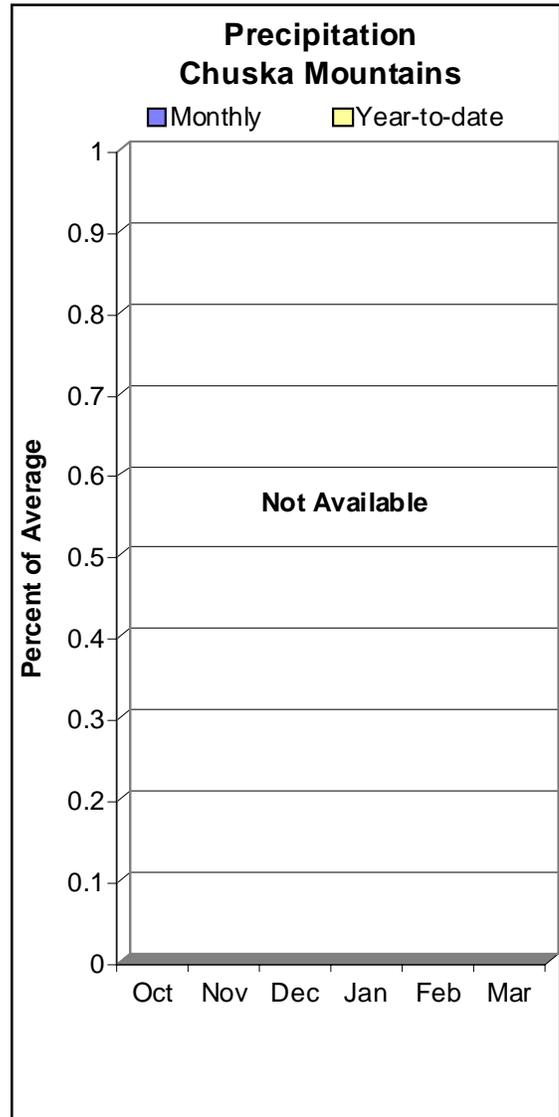
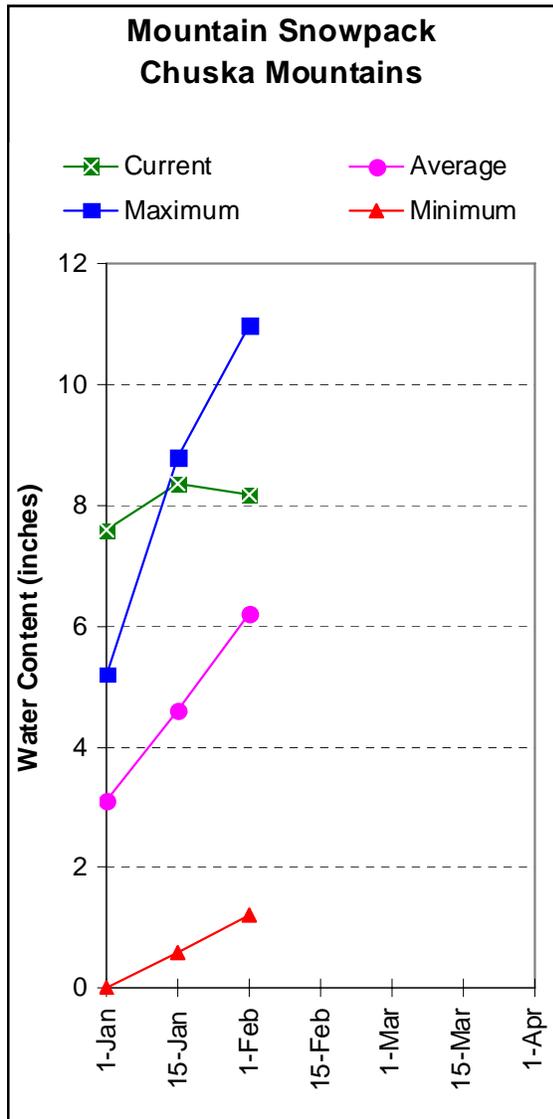
Reservoir	Usable Capacity	***** This Year	***** Usable Storage Last Year	***** Average
LYMAN RESERVOIR	30.0	14.2	9.0	14.7
SHOW LOW LAKE		NO REPORT		

LITTLE COLORADO RIVER BASIN  
Watershed Snowpack Analysis - February 1, 2009

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
LITTLE COLORADO - SOUTHERN H	9	105	132
CENTRAL MOGOLLON RIM	4	103	125

## CHUSKA MOUNTAINS as of February 1, 2009

Snow survey measurements conducted by staff of the Navajo Water Management Branch show the Chuska snowpack to be at 132% of average. Above average runoff is forecast for Captain Tom Wash, Wheatfields Creek, and Bowl Canyon Creek, whereas below average runoff is forecast for Kinlichee Creek.



CHUSKA MOUNTAINS  
Streamflow Forecasts - February 1, 2009

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===>						30 Yr Avg (1000AF)
	Chance of Exceeding *						
	90% (1000AF)	70% (1000AF)	50% (1000AF) (% AVG.)	30% (1000AF)	10% (1000AF)		
Captain Tom Wash nr Two Gray Hills							
MAR-MAY	0.42	1.76	3.50	124	6.10	12.00	2.83
Wheatfields Creek nr Wheatfields							
MAR-MAY	1.69	2.70	3.50	121	4.50	6.30	2.90
Bowl Canyon Creek abv Asaayi Lake							
MAR-MAY	0.37	0.79	1.20	120	1.74	2.80	1.00
Kinlichee Creek							
MAR-MAY	0.30	0.86	1.50	88	2.40	4.20	1.70

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

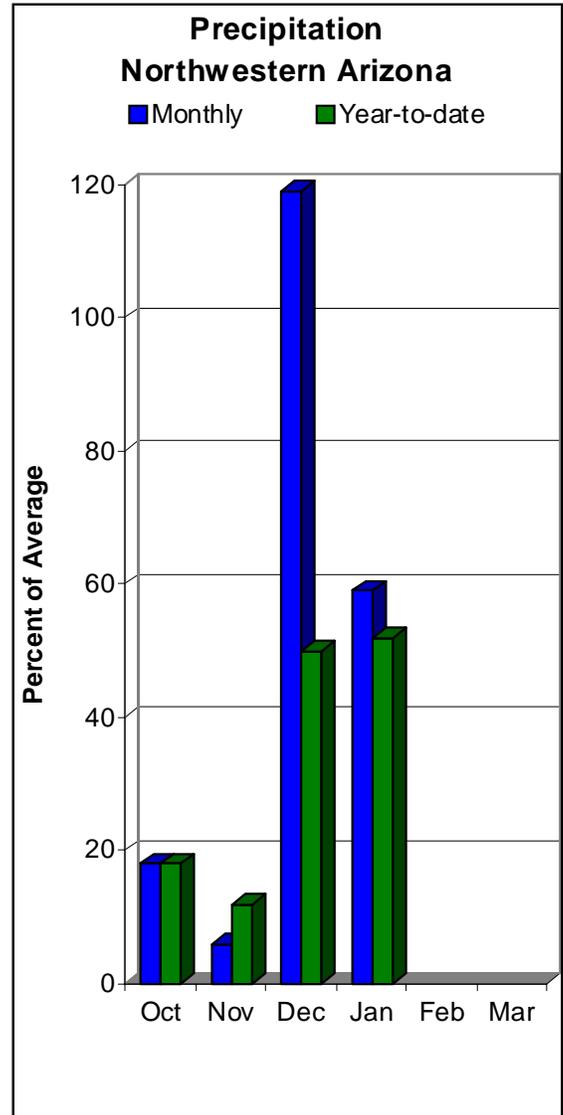
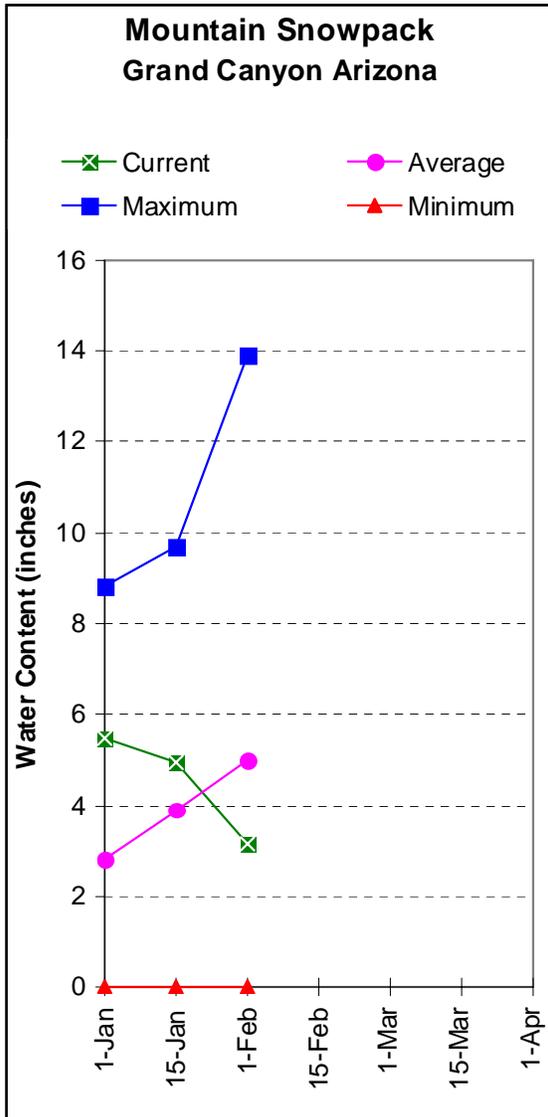
The average is computed for the 1971-2000 base period.

CHUSKA MOUNTAINS  
Watershed Snowpack Analysis - February 1, 2009

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
CHUSKA MOUNTAINS	7	108	132
DEFIANCE PLATEAU	2	77	93

## NORTHWESTERN ARIZONA as of February 1, 2009

On the Colorado River, inflow to Lake Powell is forecast at 101% 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 63% of average.



NORTHWESTERN ARIZONA  
Streamflow Forecasts - February 1, 2009

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===>						30 Yr Avg (1000AF)
	Chance of Exceeding *						
	90% (1000AF)	70% (1000AF)	50% (1000AF) (% AVG.)	30% (1000AF)	10% (1000AF)		
Virgin River at Littlefield							
APR-JUL	36	56	71	96	88	117	74
Lake Powell Inflow (2)							
APR-JUL	4610	6630	8000	101	9370	11400	7930

\* 90%, 70%, 50%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1971-2000 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.

NORTHWESTERN ARIZONA  
Reservoir Storage (1000AF) End of January

Reservoir	Usable Capacity	***** This Year	Usable Storage Last Year	***** Average
LAKE HAVASU	619.0	559.3	555.0	551.8
LAKE MOHAVE	1810.0	1647.4	1662.8	1672.3
LAKE MEAD	26159.0	12573.0	13017.0	21992.0
LAKE POWELL	24322.0	13147.0	10880.0	18463.0

NORTHWESTERN ARIZONA  
Watershed Snowpack Analysis - February 1, 2009

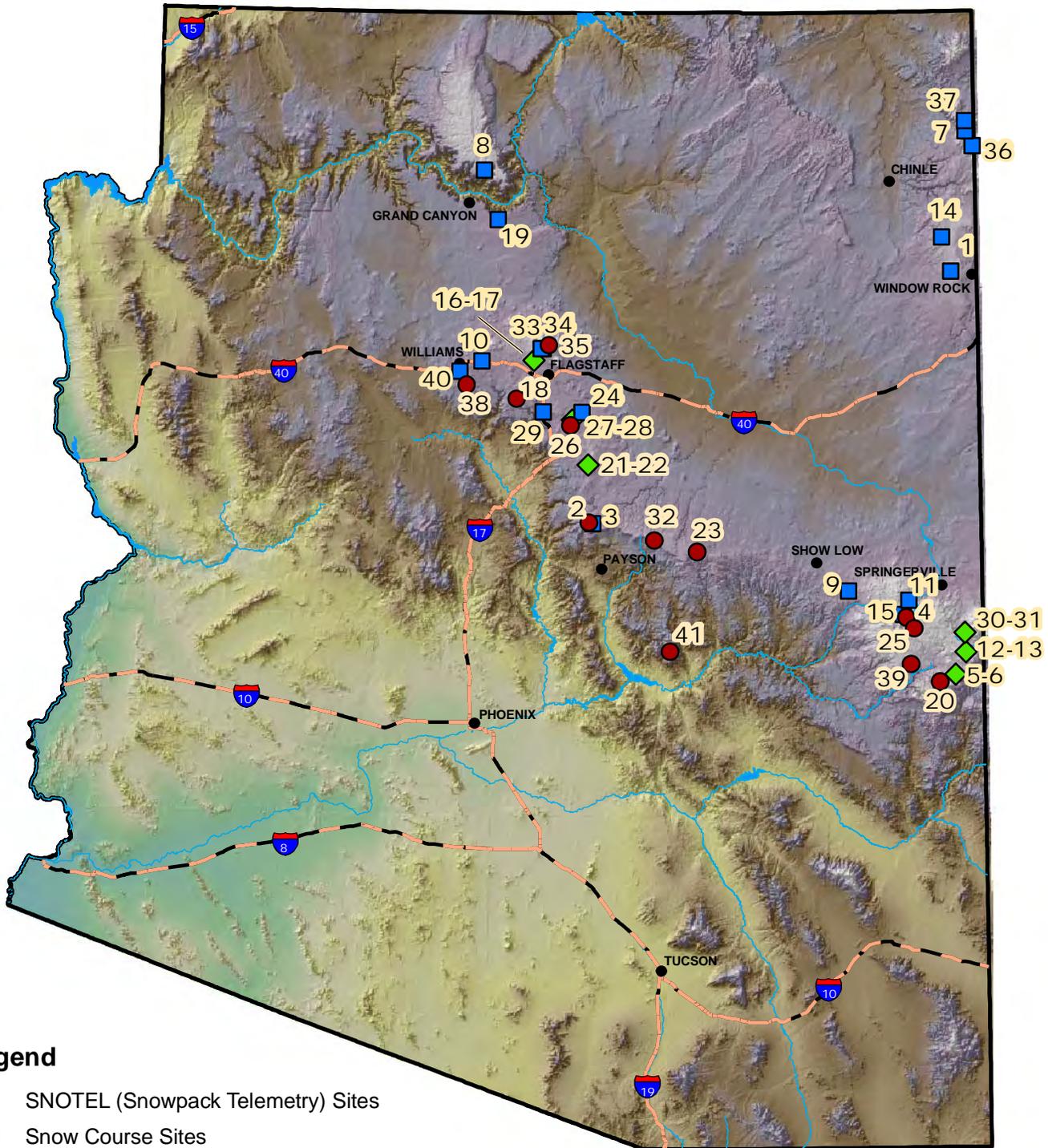
Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
GRAND CANYON	2	60	63

S N O W   S U R V E Y   D A T A

FEBRUARY 1, 2009

MAP NUM.	SNOW COURSE	ELEV.	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 71-00
1.	ARBABS FOREST (AK)	7680	1/29	6	2.3	3.0	2.6
2.	BAKER BUTTE SNOTEL	7330	2/01	12	4.7	6.4	4.6
3.	BAKER BUTTE #2	7700	1/28	21	8.9	8.4	8.2
4.	BALDY SNOTEL	9220	2/01	25	8.1	8.9	5.7
5.	BEAVER HEAD	8000	1/29	4	1.2	3.8	2.8
6.	BEAVER HEAD SNOTEL	7990	2/01	9	3.6	4.9	3.1
7.	BEAVER SPRING	9220	1/29	28	10.2	10.2	7.5
8.	BRIGHT ANGEL	8400	1/30	14	5.4	9.0	7.5
9.	BUCK SPRING	7400	1/29	16	6.0	3.2	4.8
10.	CHALENDER	7100	1/29	11	3.8	3.7	2.5
11.	CHEESE SPRINGS	8600	1/27	17	5.2	4.5	4.3
12.	CORONADO TRL SNOTEL	8400	2/01	6	3.2	6.0	3.2
13.	CORONADO TRAIL	8350	1/29	5	1.5	5.3	2.6
14.	FLUTED ROCK	7800	1/29	9	3.0	3.9	3.1
15.	FORT APACHE	9160	1/28	26	8.6	8.8	6.1
16.	FORT VALLEY	7350	1/28	9	3.1	4.8	2.4
17.	FORT VALLEY SNOTEL	7350	2/01	5	2.5	-	-
18.	FRY SNOTEL	7220	2/01	21	9.0	7.7	4.9
19.	GRAND CANYON	7500	1/29	3	1.0	1.6	2.6
20.	HANNAGAN MDWS SNOTEL	9020	2/01	26	6.0	11.9	8.6
21.	HAPPY JACK	7630	1/28	10	3.1	7.1	3.8
22.	HAPPY JACK SNOTEL	7630	2/01	12	5.6	8.1	3.7
23.	HEBER SNOTEL	7640	2/01	16	6.6	6.8	4.8
24.	LAKE MARY	6930	1/28	16	5.1	5.1	2.7
25.	MAVERICK FORK SNOTEL	9200	2/01	33	11.6	12.6	7.3
26.	MORMON MTN SNOTEL	7500	2/01	18	7.2	8.5	4.9
27.	MORMON MTN SUMMIT #2	8470	1/28	32	12.8	9.2	9.1
28.	MORMON MTN SUMMIT SN	8500	2/01	28	10.6	-	-
29.	NEWMAN PARK	6750	1/28	8	2.9	5.6	2.5
30.	NUTRIOSO	8500	1/29	0	.0	-	1.7
31.	NUTRIOSO SNOTEL	8500	2/01	0	.2	-	-
32.	PROMONTORY SNOTEL	7900	2/01	28	13.9	11.6	9.7
33.	SNOW BOWL #1 ALT.	10260	1/30	35	12.6	18.4	8.7
34.	SNOW BOWL #2	11000	1/30	43	14.2	20.2	11.8
35.	SNOWSLIDE CYN SNOTEL	9750	2/01	50	17.0	21.7	9.1
36.	TSAILE CANYON #1	8160	1/29	20	6.7	5.4	5.3
37.	TSAILE CANYON #3	8920	1/29	28	9.4	9.0	7.2
38.	WHITE HORSE SNOTEL	7180	2/01	11	5.0	6.2	3.8
39.	WILDCAT SNOTEL	7850	2/01	8	3.8	3.7	3.4
40.	WILLIAMS SKI RUN	7720	1/29	26	9.8	7.7	6.1
41.	WORKMAN CREEK SNOTEL	6900	2/01	20	11.2	3.8	4.8

# Arizona Snow Survey Data Sites



## Legend

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

